Three Essays on the Employment of Veterans

By

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Abstract

This dissertation consists of three chapters; each chapter is organized as a separate essay. All three essays focus on the effect of the military service on the civilian labor market performance of veterans.

Chapter 1 examines the unemployment impact of prior military service on the veterans. In order to control for non-random selection into the military, chapter introduces new set of instrumental variables exploiting the variation in economic and military characteristics of the states when young people make their enlistment decisions. Using Integrated Public Use Microdata Series from the American Community Survey (ACS) from 2008 to 2014, I find that among those in the civilian non-institutional labor force, veterans are equally likely to be unemployed as comparable non-veterans once they are in the labor force.

In 2011, the Veterans Opportunity to Work to Hire Heroes Act was established to improve the employment outcomes of veterans. Using data from the Current Population Survey from 2010 to 2013, Chapter 2 provides evidence on the impact of the Veterans Opportunity to Work Act of 2011 (VOW) on labor market performance of veterans. The effect of the legislation was evaluated on five outcomes; labor force participation, unemployment, employment, weekly hours of work and weekly earnings. These effects are analyzed separately in gender and disability subsamples. The identification of the impact of the VOW Act relies on comparing the change in outcomes between veterans and non-veterans in subsamples. Differences-in-Differences estimates suggest that veterans without disability increase their labor force participation by around 4 percentage points after the VOW Act was put into effect. Also, this increase in labor force participation among male veterans without disability lead to higher

chances of employment by about 3 percentage points. Female veterans with disability have the highest increase in employment by about 17 percentage points. As for unemployment, veterans with disability lower their chances of unemployment by more than 10 percentage points. Higher chances of employment lead to an increase in the weekly hours of work among veterans with disability. Finally, I find that employment gain from the legislation does not lead to an increase in the weekly earnings.

Representation of women in the U.S. military has increased gradually with the beginning of the voluntary era. However, related literature lacks empirical research on the potential gender differential effects of the military service. This paper intends to explore and show evidence whether the impact of the recent period of service including overseas combat or war zone experience, service-related disability status and presence of young children at home affect the post-service labor market performance of female veterans. Labor market success is measured by four outcomes: labor force participation, employment, unemployment and usual weekly hours of work.

Using data from the Veteran Supplement to the CPS from 2007 to 2013, I estimate labor force participation, unemployment and employment by probit models and hours of work by OLS. I find that females are less likely to participate in the labor force and less likely to be employed and work less than male veterans. Combat zone experience, presence of a young child at home, being married to a spouse in the armed forces affect female veterans adversely as compared to male veterans.

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Chapter 1

Unemployment Among the Recent Veterans

1.1 Introduction

The Volunteer era of the military started in 1973, after the Vietnam War ended. Beginning with the Volunteer era, the military had to compete with the private sector for young adults in order to fill its vacancies. Each year thousands of young men and women are screened and enlisted to various branches in the Volunteer Armed Forces. It has become a major[1] source of employment for young men and women aged 18 to 25, who make up the 49.6% of the active duty component (Department of Defense, 2014). Military service, which is the largest vocational institution in the country, may provide skills that are transferable to the civilian labor market (Mangum & Ball, 1987).

Many young adults make a decision after high school whether to continue their education in college, or to enter the labor force and acquire work experience. Joining the military is one of the main choices young adults consider when graduating from high school. Many among those young adults choose military with the hope of gaining employment and educational benefits in the civilian labor market after the service. Questions in mind would be whether the military experience would bring better employment opportunities than entering the labor force directly or whether the military experience on the resume would be valuable to employers. The effect of the military service on the aggregate human capital of the economy

[1] As of March 2016, number of active duty military personnel serving in the U.S. Armed Forces is 1,344,747 (DMDC, 2016).

may be larger than any other institutional source of training other than the public education system (Bryant, Samaranayake, & Wilhite, 1993).

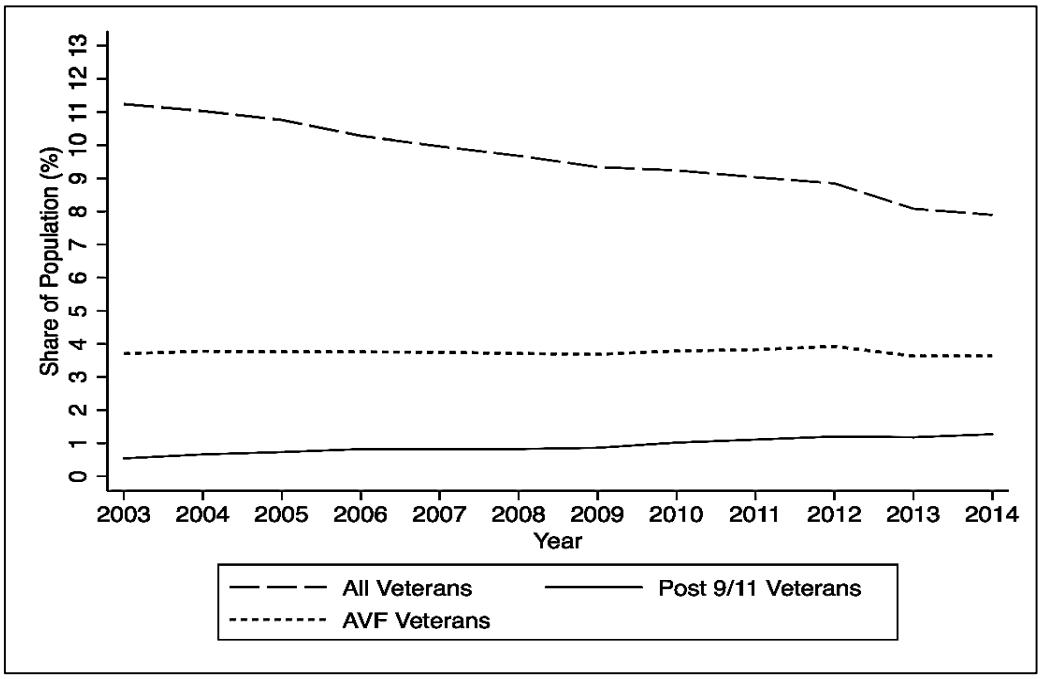

Figure 1.1 Veteran Population as a Share of Civilian Population

Note: Data drawn from the Integrated Public Use Microdata Samples (IPUMS) from the American Community Survey (ACS). Sample is limited to those ages 18 and over.

Figure 1 presents the share of veteran[2] populations by service periods in U.S. civilian population ages 18 and over. Over the years, share of veterans in civilian population decreases from 11% to 8% in 2014. However, as veterans of the Global War on Terrorism (GWOT) return to civilian life, their share of civilian population increases. According to Bureau of Labor Statistics, there were 3.6 million veterans who had served during the post-9/11 era (Labor Statistics, 2016).

[2] In data, Veterans are self-identified as men and women who served formerly in the active duty component of the U.S. military in time of peace or war anywhere in the world and who were civilians at the time these data were collected. https://usa.ipums.org/usa-action/variables/VETSTAT#description_section Active duty means full-time service as a member of the Army, Navy, Air Force, Marine Corps, and Coast Guard. Individuals who train in the national guard or reserve component of the military are not counted as active unless called to active duty and serve the full period (Szymendera, 2015). However, in data those veterans who were called up to active service are not explicitly differentiated from normal veterans.

The post-service outcomes of veterans have been a popular topic of interest for many social science researchers and policymakers since the beginning of the Volunteer era. Labor economists have focused on investigating the effect of military service on the civilian labor market performance of veterans. Over the last decade, the military has been more active because of the 9/11 terrorist attacks. It has had two major overseas deployments in the Global War on Terrorism (GWOT) including Afghanistan (Operation Enduring Freedom) and Iraq (Operation Iraqi Freedom), deploying over two million U.S. troops since October 2001 (Cesur, Sabia, & Tekin, 2013).

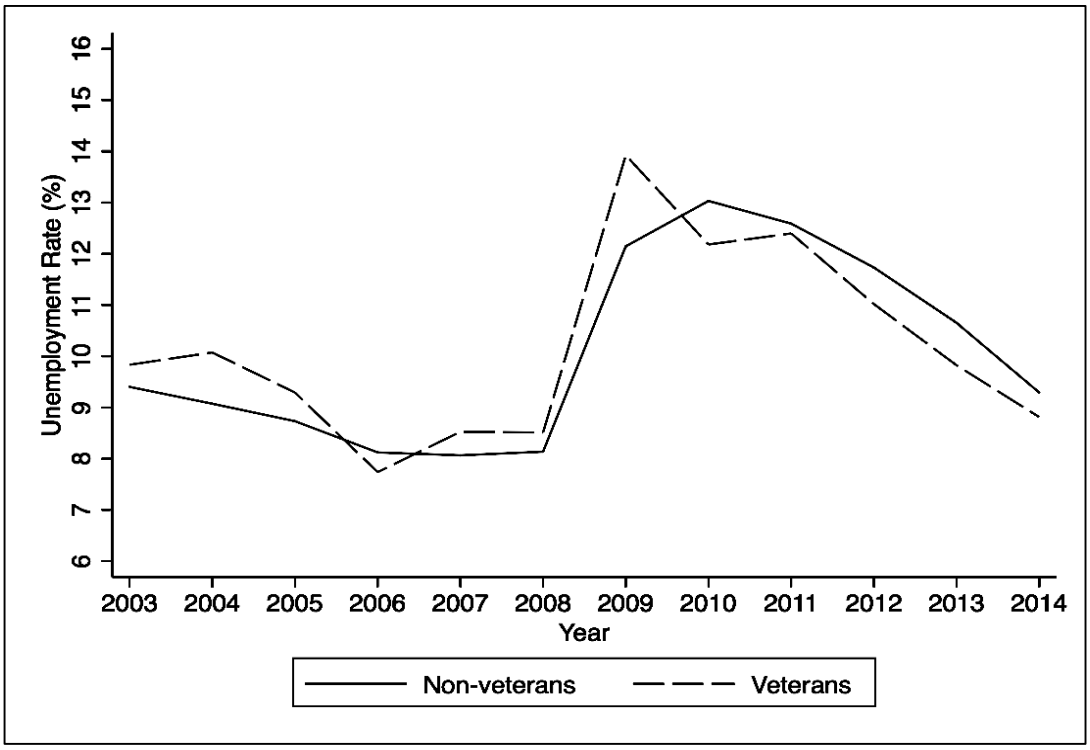

Figure 1.2 Rate of Unemployment by Veteran Status

Note: Data drawn from the Integrated Public Use Microdata Samples (IPUMS) from the American Community Survey (ACS). Sample is limited to those ages 18 to 40.

These wars have had enormous financial costs to the U.S. government, but at the same time they have had a large impact, whether positive or negative, on the young American labor

force. This period of long-lasting overseas deployments is the first challenge the all-volunteer forces have ever experienced since the draft era ended. Particularly, with the unfavorable effect of the recent recession on employment, civilian labor market performance of veterans has been questioned in the media several times (Hicks, 2014; Plumer, 2013; Steenwyk, 2012).

This paper estimates the impact of the post-9/11 military service on the probability that the veterans are unemployed using three different approaches introducing a new set of instrumental variables. Limited past empirical studies are inconclusive about how former military service is related to subsequent civilian labor market outcomes. Most studies find positive labor outcomes for the World War II veterans, it is found the opposite for the Vietnam veterans. And studies on the all-volunteer era veterans are not clear yet. A key contribution of this chapter relative to broader literature is the use of new methodological approach. Particularly, in the volunteer era, veteran status is reflecting nonrandom selection into the military. Veterans are self-selected and screened by the military, thus without controlling for self-selection, estimates will be biased and models will not be causal. In order to identify and isolate the net effect of veteran status, I make use of average unemployment rate and sum of veteran and military populations as a share of youth population in state during high school years of individuals using an adequately large data from the American Community Survey of the Integrated Public Use Microdata Samples from 2008 to 2014. IV(2SLS) results show that the military experience has no effect on the probability that a veteran is unemployed once they are in the labor force. Also, results suggest that veterans are more likely to be employed and more likely to be in the labor force.

The rest of the paper is structured along the following lines. In Section II, brief summary of the related literature and the theoretical background are presented. Section III

describes the data and presents the preliminary statistics. Section IV details the estimation procedure and interprets the results. Section V concludes and discusses the results.

1.2 Background

1.2.1 Theoretical background

There are several channels related to how military service would be associated with positive or negative civilian labor market performance. For a positive return to military service, several explanations are present in the literature showing that veterans are more employable and earn more. Some researchers have stated that the military experience may serve as a bridging environment for racial and ethnic minorities so that they can benefit most by gaining the common values in the society they lacked before joining the military (Browning, Lopreato, & Poston, 1973; Martindale & Poston, 1979). In this perspective, the military provides the individuals with certain soft skills such as discipline, communication and following orders in the strict hierarchical organization that helps them transition from young adulthood to the civilian labor market. These skills are especially valuable in higher paying occupations in the civilian sector.

On the other hand, in particular for the Vietnam veterans, military service is found negatively related with the subsequent civilian labor market performance of the veterans. Studies report that the Vietnam veterans may be stigmatized such that public perceived the military as unfavorable considering the abuse of drugs among soldiers, and so that the veterans were not welcomed as well as the World War II veterans (Cohen, JereWarner, Rebecca L.Segal, 1995; Schwartz, 1986). Another possible negative aspect of military service is that veterans exposed to combat and deaths during service return to civilian life with high rate of mental disorders, such as Post Traumatic Stress Disorder (PTSD) (Cesur et al., 2013; Maclean,

2010). Employers may assess veterans returning from wartime military service as less productive than usual.

Another explanation for a positive return to military service is that the military experience can act as a positive signal to employers (De Tray, 1982). They can use this signal to distinguish productive workers from less productive workers because all recruits are screened first and then selected into the military. The Department of Defense has strict requirements for people to enter the armed forces. Being a veteran may signal to employers that he or she has passed several physical and cognitive exams and served in a bureaucratic organization requiring strict work habits and high moral standards. Among the apparent characteristics of the veterans, leadership skills, punctuality, hard work and discipline may make veterans more employable and thus provide them with an earnings premium.

1.2.2 Related Literature

The previous literature on the effect of military service on the civilian labor market performance of returning veterans has not been conclusive. The effect of military service that has been found in past studies varies according to economic or non-economic reasons, like whether veterans serve in a peacetime or wartime period, or whether they are drafted or not. Previous results, therefore, may be categorized in terms of historical context such as findings on World War II veterans, Vietnam veterans and all-volunteer era veterans. Studies are mostly consistent in finding a positive effect of military service on the labor market performance of veterans of World War II and Korea but the situation appears different for the Vietnam era veterans (J. D. Angrist, 1990; J. Angrist & Krueger, 1994; Martindale & Poston, 1979; Rosen & Taubman, 1982; Schwartz, 1986; Teachman, 2004b).

The Volunteer era comes with its own difficulty of identifying veteran status because they are all self-selected and screened by the military. Findings about the impact of military service in the all-volunteer era are also inconclusive. Different results may be the product of the time period of military service or the data and methodologies used in the analyses.

Using Social Security Administration data, Angrist (1998) finds that veterans of the 1980s had higher employment rates after service than the comparable non-veterans. However, the author shows this employment gain does transform to a small increase in earnings for non-white veterans and a modest decrease in earnings of white veterans. Angrist uses two identification strategies for veteran status including matching methods comparing applicants who enlisted with applicants who did not enlist and the instrumental variables approach exploiting the error in the scoring of screening exams of the military prior to 1977. However, the latter approach may not be used for the veterans of the post-9/11 era.

Providing a comprehensive literature on the labor market impacts of voluntary military service on the veterans, Hirsch and Mehay (2003) compare earnings between reservists who are veterans and reservists with no active duty experience. The authors used a matched comparison strategy in order to identify veteran status using data from the Reserve Component Surveys. They find that veterans earn more than non-veterans by about 3% and this wage premium largely results from the officer veterans.

Without using an identification strategy in order to reduce self-selection bias, Kleykamp (2013) finds that recent veterans are more likely to be unemployed than non-veterans using a pooled sample from Current Population Survey (CPS). Also, she shows that employment penalty is higher among female veterans than male veterans but veterans on average earn more than non-veterans.

In a recent investigation using samples from the National Longitudinal Survey of Youth (NLSY), Routon (2014), finds that minority veterans gain about 10% wage premium as compared to non-veterans, but he finds no significant difference between veterans and nonveterans in terms of employability. His identification strategy to reduce self-selection bias uses sibling fixed effect and propensity score matching. He chooses the NLSY because it provides rich information about military and family background; however, NLSY is weakened by the small sample sizes of veterans, which is less than 400. This may bring up the question of external validity.

A key contribution of this study to the related literature is the use of new instrumental variables to identify the veteran status using an adequately large nationally representative data from the American Community Survey (ACS) Integrated Public Use Microdata Samples (IPUMS). In order to estimate employment of veterans, this chapter uses three different methodologies; ordinary least squares, instrumental variables (2SLS) and bivariate probit. IV (2SLS) and bivariate probit models make use of instrumental variables approach that minimizes the likelihood that the effects of unobserved characteristics produce biased results. My method of analysis exploits the variation in state-level economic and military population characteristics at the time of the enlistment decision to construct instrumental variables that affect the probability of enlistment but are not a direct determinant of the labor market outcomes when they return to civilian life after service. These new set of instruments, which are matched with individuals when they are 17 years old, are average state unemployment rate during high school years of a person (ages 15, 16, and 17) as an indicator of labor market conditions of the state and sum of military and veteran populations as a share of youth population in state (ages 18 to 24).

1.3 Data and Summary Statistics

The empirical investigation in this study uses data from various sources. The primary data comes from the American Community Survey (ACS) Integrated Public Use Microdata Samples (IPUMS) from 2008[3] to 2014, which is the latest publicly available data set (Ruggles et al., 2015). The ACS is an annual survey that collects information about basic demographics and economic characteristics of the U.S. population. It surveys a nationally representative sample of approximately 250,000 different households every month and is reported as a single-year sample annually. Pooled data consists of one percent year samples including records on over 3 million individuals.

This adequately large dataset is suitable for analysis not only because it collects information about veteran status, but also because it contains information about individuals' state of birth[4]. In my empirical strategy individuals' state of birth are critical in order to identify veteran status. Calculations[5] show evidence that persons more likely to stay in their state of birth until the age of 17. After this age, they tend to leave their state of birth for economic or educational reasons. For that reason, to increase the accuracy, I restrict the sample to those who were born in the U.S.[6]

Department of Defense (DoD) requires that individuals must be at least 17 years old to be enlisted into the military. By the end of high school, most young adults, particularly men,

[3] The year 2008 is mainly chosen because it is the beginning of a significant economic phenomenon, the Great Recession. This period was a hard time for the U.S. labor market and unemployment peaked. During the recession and the following years employment performance of returning veterans as compared to non-veterans drew attention by policy makers and the media (Hicks, 2014; Loughran, 2014; Plumer, 2013; Steenwyk, 2012).
[4] For my study, the Current Population Survey (CPS) is another option. However, since the CPS does not provide birthplaces in state levels, which is critical for identification of veteran status, I continue with the ACS.
[5] In 2014 about 80% of all individuals age 17 stay in their state of birth.
[6] I have also run my regressions without excluding individuals who were born abroad, but there is not significant difference at all with what is presented here. In order to be consistent with my approach I present only results with excluding them.

have already made a decision whether to go to college or to the military (Bachman, Segal, Freedman-Doan, & O'Malley, 2000). And their decisions are correlated with the economic conditions and the environment they face at the age of 17.

This paper introduces new instruments to identify veteran status: average state unemployment rate as percentages during high school years (when they were 15, 16, 17); sum of veteran and military populations as a share of youth population (ages 18 to 24), as percentages, in individuals' state of birth when they were 17. These key variables are created from different data sources such as the U.S. Bureau of Labor Statics (BLS website), the Defense Manpower Data Center (DMDC) and the Current Population Survey's (CPS) Veteran Supplement dataset.

The analytic sample is restricted to those who are in the civilian non-institutional labor force[7], consisting of individuals who are employed or unemployed. Individuals are employed if they had a paid job during the reference week, and they are unemployed if they had no paid job but were seeking employment.

Recent veterans come from all-volunteer era, instead of a draft era, and are mostly subject to overseas deployments to Iraq or Afghanistan or both. For a credible comparison between recent veterans and non-veterans, I restrict my analytic sample to those ages 18 to 40 in the survey years. The lowest age is set to 18 because there is almost no returning veteran at a lower age. Age 40 reflects the time a veteran who enlisted at age 18-22 would start to receive retirement pension. Veterans receiving retirement pension may reduce labor supply.

Descriptive statistics for the analytic sample is presented in Table 1.1. There are significant differences between veteran and non-veteran populations across covariates. On average veterans have lower unemployment rate, which is below 10 percent, than non-veterans.

[7] The U.S. civilian labor force excludes active duty military personnel.

Table 1.1 Summary Statistics by Veteran Status

	Unemployment	
Variables	**Veterans**	**Non-veterans**
Unemployment	0.092***	0.108
Labor Force Participation	0.872***	0.786
Employment to Population	0.791***	0.701
Disability status	0.217***	0.042
Female	0.157***	0.503
Age	32.615***	29.049
Married	0.573***	0.396
Divorced/Widowed/Separated	0.165***	0.077
Never married	0.262***	0.527
< High School	0.012***	0.072
High School/GED	0.256***	0.250
Some College	0.505***	0.370
BA+	0.228***	0.308
White, non-hispanic	0.751***	0.734
Black, non-hispanic	0.117***	0.107
Other, non-hispanic	0.043***	0.051
Hispanic	0.088***	0.108
Urban residence	0.714***	0.735
Any child < 6 years old at home?	0.274***	0.216
Enrolled in school	0.173***	0.211
Average State Unemployment	5.836***	5.772
Share of Military and Veteran Pop.	11.077***	9.436
N	134,903	3,621,941

Notes: This table shows sample means from the ACS IPUMS 1 percent year samples from 2008 to 2014. Sample is restricted to those ages 18 to 40 and who were born in the U.S. Stars indicate significance levels from t-test of mean equality across veteran status. * $p<0.05$,** $p<0.01$, ***$p<0.001$

Table 1.2 Mean Unemployment Across Veteran Status within Sub-samples

	Unemployment		
	Veterans	**Non-veterans**	**Difference**
Ages 18 to 29	0.135	0.140	-0.005**
Ages 30 to 40	0.074	0.074	-0.001
Female	0.100	0.099	0.001
Male	0.091	0.118	-0.027***
White, non-Hispanic	0.083	0.087	-0.004***
Black, non-Hispanic	0.138	0.210	-0.072***
Other, non-Hispanic	0.117	0.140	-0.023***
Hispanic	0.098	0.140	-0.041***
Less than High school	0.173	0.268	-0.095***
High school/GED	0.125	0.156	-0.032***
Some college	0.095	0.101	-0.007***
BA+	0.047	0.041	0.007***
N	134,903	3,621,941	

Notes: This table shows sample means from the ACS IPUMS 1 percent year samples from 2008 to 2014. Sample is restricted to those ages 18 to 40 and who were born in the U.S. Stars indicate significance levels from t-test of mean equality across veteran status within each sub-sample. * p<0.05,** p<0.01, ***p<0.001

Veterans are more likely to be in the labor force and more likely to be employed. Although increasing, female population in the military is far less than men, which is recorded 14.9 percent in the active duty component of Department of Defense in 2014, which reflects a similar veteran composition in the civilian population (Defense, 2014). On average veterans are older, more likely to be married, have higher rate of college degree but lower rate of bachelor or higher degree, and have higher rate of disability[8] than non-veterans.

[8] In data, disability status self-reportedly indicates whether an individual has one or more kinds of difficulties, which include cognitive difficulties (such as learning, remembering, making decisions), conditions limiting one's physical activities and making it difficult for them to take care of their own personal needs and having severe blindness or

Table 1.2 shows the mean unemployment for each veteran and non-veteran sub-samples. On average veterans have lower unemployment among all sub-samples except among those who have bachelors' or higher degree. However, there is no significant difference among older age group and female samples. Among race/ethnicity samples, the biggest employment gain is among African Americans.

1.4 Estimation and Results

1.4.1 Empirical Strategy

The main goal of this paper is to estimate the employment impact of the recent military service on the veterans of the Global War on Terrorism. If the individuals were randomly selected into the military, ordinary least squares (OLS) estimation of the following probability model would provide the average treatment effect of the military service:

$$Y_i = \alpha + Veteran_i \Upsilon + X_i \beta + \varepsilon_i \quad (1)$$

Y_i is unemployed equals 1 if an individual i is unemployed during the survey time; α is an intercept; $Veteran_i$ is an indicator whether the individual i is a veteran; Υ is the parameter denoting military treatment effect; X_i is a set of observable explanatory variables; β is the vector of parameters; ε_i is the unobservable error term. Similar to social programs in evaluation research, military service can be seen as a treatment given to a treatment group, and the effect of military service on veterans' civilian labor market performance can be seen as the treatment effect on the treated group.

Identifying the net effect of active duty military experience on the civilian labor market performance of the volunteer-era veterans is not a straightforward mission because individuals

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deafness. Disability status also includes whether a veteran has a service-connected disability, which is determined by disability rating, assigned by the U.S. Department of Veterans Affairs.

are self-selected into the military. Veterans may have some prior differences from non-veterans before they enter the armed forces. Maybe, the veterans are the ones who can get the most benefit from entering the military. Therefore, veteran status is likely to be correlated with the error term that veterans may differ from non-veterans along unobserved individual characteristics and economic conditions at the time of enlistment decision (Bryant et al., 1993). These differences may change the probability that they enlist relative to non-veterans. Without controlling for the non-random selection into the military, the effect of veteran status will be biased.

In this study, the problem of self-selection bias is overcome by adopting an instrumental variables (2SLS) approach by exploiting the variation in state-level military and economic characteristics to construct instrumental variables correlated with the veteran status but uncorrelated with the other determinants of unemployment. For the validity of instruments, there are two conditions to be met; the instruments should be relevant and sufficiently correlated to veteran status, and they must not be correlated to unobserved error term of the structural model. In order to test that these instrumental variables are relevant channels affecting the attitude of individuals toward enlistment, I run first stage regressions of veteran status and present joint F statistics.

Exogeneity of the instruments require that the instruments can affect veteran status and must not affect post-service employment of veterans directly. For the over-identified models, in which the number of instruments exceeds the number of endogenous variables, there is a formal procedure testing whether the excluded instruments are valid, that is uncorrelated with the error term in structural model. As presented in Table 1.4, probability value from over-identification test, Hansen J test, suggests that two instruments used in the models are valid.

One concern about the validity of the average unemployment instrument is that unemployment rates may be persistent overtime in states and individuals may stay in their same states, then past unemployment would be correlated with the current employment status. However, veterans are most likely to leave their state of birth as they are enlisted and return to civilian life after several years of service. Another concern is that Oreopoulos, von Wachter, and Heisz (2012) find that initial labor market conditions for Canadian college graduates affect their future earnings adversely but the effect disappears in ten years. Again, considering life trajectory of veterans, they leave the labor force and serve in the military for years and then return to potentially different state than their state of birth. Furthermore, Arkes (2010) examines the effect of schooling on wages and instruments average unemployment during high school years for years of schooling. Arkes finds no evidence of correlation between average unemployment rate during high school years of individuals and their current earnings.

1.4.2 Identification of Veteran Status

In order to isolate and identify the veteran status, we need to understand what factors affecting the propensity to enlist across states. Researchers have studied the effect of state unemployment rate on enlistment decisions as it is an indicator of the condition of the local labor market. It is argued that higher state unemployment reflects lower work opportunities for young adults considering employment rather than college (Bryant, Richard Wilhite, 1990; Bryant et al., 1993; Kilburn & Klerman, 1999; Teachman, 2005). In the literature, another key factor affecting enlistment decisions is presence of higher military and veteran populations in the state (Boyer & Schmitz, 1995; M. A. Kleykamp, 2006; Moore & Griffis, 1999). It is argued that higher presence of military personnel and veteran population in state affects young adults

Table 1.3 First Stage Regressions of Veteran Status

Variables	Model 1	Model 2	Model 3	Model 4
State Unemployment	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Share of Military and Veteran Pop.	0.001***	0.001***		
	(0.001)	(0.001)		
Disability status	0.129***	0.129***	0.129***	0.129***
	(0.001)	(0.001)	(0.001)	(0.001)
Female	-0.050***	-0.050***	-0.050***	-0.050***
	(0.001)	(0.001)	(0.001)	(0.001)
Married	-0.033***	-0.033***	-0.033***	-0.033***
	(0.001)	(0.001)	(0.001)	(0.001)
Divorced/Separated	0.015***	0.015***	0.015***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
Education: <High School	-0.008***	-0.008***	-0.008***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)
Education: Some college	0.026***	0.025***	0.026***	0.025***
	(0.001)	(0.001)	(0.001)	(0.001)
Education: BA+	0.045***	0.044***	0.045***	0.044***
	(0.001)	(0.001)	(0.001)	(0.001)
Non-Hispanic, Black	0.009***	0.008***	0.009***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)
Non-Hispanic, Other	-0.001	-0.002***	-0.001	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Hispanic	-0.001***	-0.002***	-0.001***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Urban residence	0.002***	0.001***	0.002***	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)
Any child < 6 years old at home?	0.001***	0.001***	0.001***	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)
Enrolled in regular school	0.015***	0.015***	0.015***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.048***	0.047***	0.052***	0.052***
	(0.002)	(0.002)	(0.002)	(0.002)
Year FE	Yes	Yes	Yes	Yes
State FE		Yes		Yes
N	3,756,844	3,756,844	3,756,844	3,756,844
R-squared	0.061	0.063	0.061	0.063
F-statistics	138.5	163.6	255.4	286.7

Notes: This table reports first stage results estimated in separate regressions for each column. Regressions include state of birth and year of birth dummies. Robust standard errors are reported in parentheses. Stars indicate significance levels * p<0.05,** p<0.01, ***p<0.001

toward enlistment by increasing the possibility of getting contact with and get to know more about the military opportunities.

Instrumental variables used in this paper are defined as average unemployment during high school years of a person (ages 15, 16 and 17), and sum of military and veteran populations as a share of youth population ages 18 to 24 when persons are 17 years old.

"First-stage" regressions for the determination of veteran status is a linear probability model identified by the exclusion of instruments from equation (1). Although binary dependent and endogenous variables introduce nonlinearity, linear probability model is preferred as an ideal specification (Conley & Heerwig, 2011; Heckman & Macurdy, 1985). I estimate the following first-stage regression by OLS:

$$Veteran_i = \theta_0 + Z_i\theta_1 + X_i\theta_2 + \eta_i, \qquad (2)$$

where Z_i is the vector of instruments, X_i is the set of control variables and η_i is unobserved error term. In addition to demographic control variables described in Table 1.1, regressions include year fixed effects since pooled samples drawn from 2008 to 2014. In order to let exogenous variation in veteran status come from the within-state differences over time in instrumental variables relative to other states, regressions include state of birth and year of birth dummies. By using year of birth dummies, I can also control for age effects on unemployment. Furthermore, including year of birth dummies is important so that I can control for yearly changes in policies, college fund benefits, bonuses, incentives determined by the Department of Defense and also, as a disincentive, combat deaths in the Global War on Terrorism, since these changes and effects are constant across states.

I estimate separate regressions using both instruments while controlling for a set of covariates. Model 1 is the base model, and in model 2, I add state fixed effects to increase the

accuracy of treatment effect. Table 1.3 shows that instruments are strongly significant in all regressions as evidenced by the sufficiently large F-statistics, exceeding 10 suggested by(Stock, Wright, & Yogo, 2002). Thus, these instruments are plausible predictors of veteran status. For instruments are state level measures, I alternatively estimate controlling for within-state standard error correlation, although not reported here, calculating cluster-robust standard errors. There is not any change and I find that the instruments are statistically significant when F-statistics are adjusted for clusters.

1.4.3 Estimation Results for Unemployment Analysis

In this part, I estimate the impact of recent voluntary military service on the probability that a post-9/11 veteran is unemployed. A reasonable preliminary approach is to use a linear probability model to estimate the likelihood of being unemployed of a veteran. Estimation results from the OLS regressions of equation (1) with different specifications are presented in Table 1.4. These OLS estimation results are presented as a benchmark model to IV (2SLS) results. Across all OLS results, keeping else constant veterans have about 1 percent less odds of being unemployed. All models include year dummies in order to control for aggregate year effects. The first column presents the results from the base model. In the second model, I add state fixed effects to increase the accuracy of the effect of veteran status. The effect of veteran status does not change much across the models after state dummies are included.

As is regular in the 2SLS approach, I estimate the second-stage regressions, equation (1), by OLS using the fitted values from the first-stage regression, which is carried out using STATA13 **ivregress** command, using the White's heteroskedastic robust standard errors. Table 1.4 also shows the 2SLS results for unemployment effects of military service in two specifications. In two models, active military service has no significant effect on the likelihood

Table 1.4 OLS and IV(2SLS) Regressions of Unemployment

	OLS	OLS	IV(2SLS)	
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Veteran Status	-0.010***	-0.009***	0.168	0.092
	(0.001)	(0.001)	(0.100)	(0.092)
Disability status	0.099***	0.099***	0.076***	0.086***
	(0.001)	(0.001)	(0.013)	(0.012)
Female	-0.010***	-0.010***	-0.001	-0.005
	(0.000)	(0.000)	(0.005)	(0.005)
Married	0.094***	0.094***	0.100***	0.098***
	(0.001)	(0.001)	(0.003)	(0.003)
Divorced/Separated	-0.048***	-0.048***	-0.051***	-0.050***
	(0.000)	(0.000)	(0.002)	(0.001)
Education: <High School	-0.077***	-0.077***	-0.076***	-0.077***
	(0.000)	(0.000)	(0.001)	(0.001)
Education: Some college	-0.042***	-0.041***	-0.047***	-0.044***
	(0.000)	(0.000)	(0.003)	(0.002)
Education: BA+	0.004***	0.005***	-0.004	0.000
	(0.001)	(0.001)	(0.005)	(0.004)
Non-Hispanic, Black	0.093***	0.093***	0.091***	0.093***
	(0.001)	(0.001)	(0.001)	(0.001)
Non-Hispanic, Other	0.037***	0.036***	0.038***	0.037***
	(0.001)	(0.001)	(0.001)	(0.001)
Hispanic	0.017***	0.016***	0.017***	0.016***
	(0.001)	(0.001)	(0.001)	(0.001)
Urban residence	-0.006***	-0.009***	-0.006***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)
Any child < 6 years old at home?	0.006***	0.006***	0.006***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)
Enrolled in regular school	-0.002***	-0.002***	-0.005**	-0.003*
	(0.000)	(0.000)	(0.002)	(0.001)
Year effects	Yes	Yes	Yes	Yes
State effects		Yes		Yes
Constant	0.106***	0.108***	0.092***	0.099***
	(0.003)	(0.003)	(0.007)	(0.007)
N	3,756,844	3,756,844	3,756,844	3,756,844
R-squared	0.071	0.072	0.063	0.072
Hansen J (P_value)			0.324	0.462

Notes: Regressions include state of birth and year of birth dummies. Robust standard errors are reported in parentheses. Stars indicate significance levels * p<0.05,** p<0.01, ***p<0.001

of unemployment, that is, veterans are as employable as non-veterans. Although the average effect of veteran status reduces in the second specification, it is still not significant.

1.4.4 Sub-population Analysis

Although I do not introduce heterogeneous treatment effect notation for reasons of simplicity, I investigate whether the effect of military service varies along demographics. I estimate unemployment of veterans in sub-samples of age groups, gender, race and educational attainment. Table 1.5 suggests that veterans are as employable as non-veterans once they are in the labor force and the effect of military service does not differ along demographic characteristics, such as gender and education. However, among younger age group, who are aged 18 to 29, and among non-white population veterans are more likely to be unemployed than their comparable peers. These estimates are bigger than expected. They may be driven by small p-value from the over-identification test. Estimates from just-identified model using average unemployment are smaller but also positive and significant

1.4.5 Alternative Strategies

1.4.5.1 Bivariate Probit Approach

The main strategy to overcome the potential self-selection bias due to non-random selection into the military uses linear instrumental variables approach. Although adopting linear instrumental variables to calculate average treatment effect of a binary treatment on a binary outcome is fairly common and supported by many scholars (J. D. Angrist & Chen, 2011; J. D. Angrist & Pischke, 2009; J. D. Angrist, 1998; Heckman & Macurdy, 1985), there is a growing body of literature uses bivariate probit in models with an endogenous binary treatment and binary outcome (Altonji, Elder, & Taber, 2005; Bhattacharya, Goldman, & McCaffrey, 2006; Chiburis, Das, & Lokshin, 2012).

Table 1.5 IV(2SLS) Estimates of Unemployment Among Sub-samples of Age Groups, Gender, Race/Ethnicity, and Education Level

Variables	Age 18 - 29	Age 30 - 40	Female	Male	< BA	BA+	White	Non-white
Veteran Status	1.104***	0.015	0.224	0.066	0.131	-0.264*	0.052	0.923***
	(0.303)	(0.101)	(0.456)	(0.081)	(0.119)	(0.137)	(0.090)	(0.347)
Disability status	0.015*	0.002			-0.011*	-0.014***	-0.004	0.026*
	(0.009)	(0.007)			(0.006)	(0.005)	(0.005)	(0.016)
Female	0.012	0.082***	0.090***	0.082***	0.100***	0.115***	0.087***	0.011
	(0.027)	(0.018)	(0.026)	(0.015)	(0.013)	(0.031)	(0.012)	(0.037)
Married	0.123***	0.083***	0.106***	0.091***			0.085***	0.128***
	(0.007)	(0.005)	(0.004)	(0.004)			(0.003)	(0.009)
Divorced/Separated	-0.061***	-0.035***	-0.048***	-0.051***			-0.045***	-0.075***
	(0.002)	(0.003)	(0.003)	(0.002)			(0.001)	(0.006)
Education: <High School	-0.064***	-0.069***	-0.081***	-0.074***			-0.070***	-0.112***
	(0.005)	(0.001)	(0.001)	(0.002)			(0.001)	(0.002)
Education: Some college	0.117***	0.055***	0.079***	0.107***	0.114***	0.035***		
	(0.001)	(0.002)	(0.004)	(0.001)	(0.001)	(0.002)		
Education: BA+	0.046***	0.027***	0.033***	0.040***	0.052***	0.013***		
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)		
Non-Hispanic, Black	0.027***	0.003***	0.018***	0.013***	0.030***	0.012***		
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)		
Non-Hispanic, Other	-0.061***	-0.051***	-0.023***	-0.063***	-0.060***	-0.021***	-0.041***	-0.089***
	(0.007)	(0.003)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.010)
Hispanic	-0.044**	-0.007*	0.011	-0.014**	0.001	0.004	0.008**	-0.062***
	(0.018)	(0.004)	(0.008)	(0.007)	(0.006)	(0.005)	(0.004)	(0.017)
Urban residence	-0.015***	-0.002***	-0.009***	-0.008***	-0.016***	-0.006***	-0.007***	-0.018***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Any child < 6 years old at home?	0.007***	0.002**	0.022***	-0.006***	0.004***	-0.001	0.004***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)
Enrolled in regular school	-0.023***	0.030***	-0.002	-0.000	-0.040***	0.031***	-0.002	-0.011**
	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)	(0.001)	(0.005)
N	1,937,716	1,819,128	1,843,827	1,913,017	2,610,232	1,146,612	2,760,024	996,820
F-stat	34.6	69.2	18.2	138.5	111.1	44.1	140.6	21.2
Hansen J_pval	0.104	0.671	0.886	0.328	0.905	0.105	0.056	0.004

Regressions include state of birth, year of birth dummies, year and state fixed effects. Constant terms are not reported due to space availability. Robust standard errors are reported in parentheses. Stars indicate significance levels * p<0.05,** p<0.01, ***p<0.001

Model frame work involves two latent variable models;

$$y_1 = \mathrm{l}(\beta_0 + \beta_1 Veteran + \beta_2 X + \varepsilon_1 > 0) \quad (3)$$

$$Veteran = \mathrm{l}(\pi_0 + \pi_1 Z + \pi_2 X + \varepsilon_2 > 0) \quad (4)$$

where y_1 is outcome variable, unemployed equals 1 if unemployed; $Veteran$ equals 1 if individual is a veterans; X is the set of demographic control variables used as previously; Z is the set of instruments. The assumption for the framework is that random errors ε_1 and ε_2 are jointly normally distributed with correlation ρ. Joint estimation is required when $\rho \neq 0$, that is, the treatment variable is endogenous. As in 2SLS approach, we expect that instruments affect only veteran status but not directly outcome variable.

Table 1.6 reports average marginal effects of probit model. In model 1, veterans are less like to be unemployed by about 7 percentage points than non-veterans. Including state fixed effects in model 2, the effect of veteran status does not change much. These estimates are much closer to the OLS estimates. Correlation coefficient, rho, and probability value from the Wald test of $\rho = 0$, supports that two equations are strongly correlated, which we expect to see for joint estimation of two equations.

1.4.5.2 Employment to Population and Labor Force Participation

Unemployment is one measure of the economic health of the labor market. Another measure of employment level is the employment to population ratio. During or after the recession times, persistent high unemployment may discourage unemployed workers so that they may stop searching actively for a job. During such times, a decrease in the unemployment rate can be misleading. As a robustness check, I estimate the main structural model adopting previous 2SLS approach replacing unemployment with the employment to population ratio and labor

force participation. The analytic sample is not restricted to those who are in the labor force, instead it includes the entire population. Age is restricted to those aged 18 to 40. Regressions include all demographic control variables used in the previous estimates. IV (2SLS) results are presented in Table 1.7. Results suggest that veterans are more likely to participate in the labor force and they are more likely to be employed than non-veterans by about 70 percentage points. These estimates are big, even though it is reflecting the huge difference in labor force participation rate and employment to population ratio presented in Table 1.1. One possible explanation is that veterans have higher motivation to be in the labor force than non-veterans.

Table 1.5 Bivariate Probit Results of Unemployment

Variables	Model 1	Model 2
Veteran Status	-0.067***	-0.072***
	(0.004)	(0.003)
Disability status	0.100***	0.101***
	(0.001)	(0.001)
Female	-0.012***	-0.012***
	(0.001)	(0.001)
Married	-0.047***	-0.046***
	(0.001)	(0.001)
Divorced/Separated	0.009***	0.010***
	(0.001)	(0.001)
Education: <High School	0.060***	0.059***
	(0.001)	(0.001)
Education: Some college	-0.039***	-0.039***
	(0.001)	(0.001)
Education: BA+	-0.080***	-0.080***
	(0.001)	(0.001)
Non-Hispanic, Black	0.084***	0.085***
	(0.001)	(0.001)
Non-Hispanic, Other	0.039***	0.038***
	(0.001)	(0.001)
Hispanic	0.017***	0.016***
	(0.001)	(0.001)
Urban residence	-0.006***	-0.009***
	(0.001)	(0.001)
Any child < 6 years old at home?	0.004***	0.004***
	(0.001)	(0.001)
Enrolled in regular school	0.004***	0.004***
	(0.001)	(0.001)
Year FE	Yes	Yes
State FE		Yes
N	3,495,470	3,495,470
Rho	0.192	0.211
P-Value (Chi2)	0.000	0.000

Notes: This table reports average marginal effects of probit models computed as average changes in predicted outcome. Derivatives for factor variables is a discrete change from the base level. Regressions include state of birth and year of birth dummies. Robust standard errors are reported in parentheses. Stars indicate significance levels * p<0.05,** p<0.01, ***p<0.001

Table 1.6 IV(2SLS) regressions of Employment and Labor Force Participation

	Labor Force Participation		Employment	
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Veteran Status	0.770***	0.646***	0.742***	0.678***
	(0.130)	(0.118)	(0.143)	(0.131)
Disability status	-0.342***	-0.332***	-0.350***	-0.345***
	(0.011)	(0.010)	(0.012)	(0.011)
Female	-0.049***	-0.055***	-0.036***	-0.039***
	(0.006)	(0.006)	(0.007)	(0.006)
Married	-0.104***	-0.108***	-0.134***	-0.136***
	(0.004)	(0.004)	(0.004)	(0.004)
Divorced/Separated	0.038***	0.040***	0.069***	0.071***
	(0.002)	(0.002)	(0.002)	(0.002)
Education: <High School	0.107***	0.108***	0.164***	0.165***
	(0.001)	(0.001)	(0.001)	(0.001)
Education: Some college	-0.024***	-0.021***	0.012**	0.014***
	(0.004)	(0.003)	(0.004)	(0.004)
Education: BA+	-0.001	0.005	-0.007	-0.004
	(0.006)	(0.005)	(0.007)	(0.006)
Non-Hispanic, Black	-0.008***	-0.005***	-0.075***	-0.073***
	(0.001)	(0.001)	(0.001)	(0.001)
Non-Hispanic, Other	-0.044***	-0.042***	-0.065***	-0.062***
	(0.001)	(0.001)	(0.001)	(0.001)
Hispanic	0.020***	0.022***	0.004***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Urban residence	0.004***	0.006***	0.007***	0.011***
	(0.001)	(0.000)	(0.001)	(0.001)
Any child < 6 years old at home?	-0.061***	-0.061***	-0.062***	-0.063***
	(0.001)	(0.001)	(0.001)	(0.001)
Enrolled in regular school	-0.177***	-0.175***	-0.151***	-0.150***
	(0.002)	(0.002)	(0.002)	(0.002)
Year effects	Yes	Yes	Yes	Yes
State effects		Yes		Yes
Constant	0.740***	0.740***	0.742***	0.678***
	(0.012)	(0.011)	(0.143)	(0.131)
N	4,760,687	4,760,687	4,760,687	4,760,687
R-squared	0.064	0.093	0.100	0.113
F-statistics	155.12	182.1	155.12	182.1
Hansen J (P_value)	0.042	0.032	0.134	0.060

Notes: This table reports IV(2SLS) estimates of Employment and Labor Force Participation. First Stage regressions are not reported but joint significance F-Statistics are reported. Regressions include state of birth and year of birth dummies. Robust standard errors are reported in parentheses. Stars indicate significance levels * p<0.05,** p<0.01, ***p<0.001

1.5 Concluding Remarks

Using Integrated Public Use Microdata Series from 2008 to 2014 of the American Community Survey (ACS), I estimate the causal effect of military service, including military training and on-the-job experience on the employment of recent veterans. This paper contributes to the related literature on the employment effects of being a veteran by introducing a new set of instrumental variables in order to control for nonrandom selection into the military. The new set of instrumental variables exploit the variation in state-level military and economic characteristics when individuals are 17. These new instrumental variables, average unemployment during person's high school years and sum of veteran and military populations as a share of youth population in state, proved to be valid instruments that are sufficiently correlated with veteran status but uncorrelated with other determinants of the unemployment and employment outcomes.

I find that veterans are as employable as comparable non-veterans once they participate in the civilian non-institutional labor force and this employment effect does not change across sub-populations of gender and education which is consistent with findings by Routon (2014). However, I find that younger veterans and non-white veterans are more likely to be unemployed. On the other hand, using bivariate probit approach I find that veterans are more employable than nonveterans by about 7 percentage point. And this is closer to OLS results in magnitude. These estimates differ from the findings by Kleykamp (2013) which conclude that recent veterans are more likely to be unemployed and female veterans have steeper unemployment penalty. One possible explanation is that both papers use different methodology, different data set and different time range.

Although this new set of instrumental variables are showed to be valid by presenting supporting test results and related literature that used them previously, there are space for improvement. Instead of using state level characteristics, we could use smaller geographic variable if I have county of birth so that I could reduce potential measurement error. Another point, parental background information is valuable in predicting persons' choices over military enlistment. Although large, public use micro data samples do not include such information. The National Longitudinal Survey of Youth samples include this type of information but this valuable data lacks enough observation on veterans.

Chapter 2

The labor market impact of "The VOW Act" on Veterans

2.1 Introduction

The U.S. military has made two major overseas deployments in the Global War on Terrorism since the 9/11 terrorist attack. After relatively peacetime period for the all-volunteer army, which started in 1973, recent long lasting overseas deployments and the wartime period have been a great challenge for the returning veterans. Moreover, 29 percent of veterans who served during the recent period of deployments since 2001 were reported to have a service-related disability in August of 2014, compared with 16 percent of all veterans (Labor Statistics, 2016). Several studies, the national labor statistics reports and the media suggested that as the veterans of this recent war period return to civilian life, the unemployment rate of veterans increased and was found to be higher than their comparable non-veteran peers (Faberman & Foster, 2013; Heaton & Krull, 2012; Humensky, Jordan, Stroupe, & Hynes, 2012; M. Kleykamp, 2013; Loughran, 2014).

As an effort to eliminate this unemployment gap between veterans and nonveterans, the U.S. Government passed the "Veterans Opportunity to Work to Hire Heroes Act of 2011 (VOW Act)", signed by President Obama on November 21st 2011. The VOW Act was designed to lower unemployment among veterans by providing incentives to employers to hire unemployed veterans. The VOW Act consists of two tax credits. The Returning Heroes Tax Credit is committed to providing a maximum tax credit of $2,400 for employers who hire short-term unemployed veterans and a tax credit of up to $5,600 for firms who hire long-term unemployed

veterans. Moreover, for the businesses that hire veterans with service-related disabilities, the Wounded Warriors Tax Credit is intended to provide them with a maximum credit of $9,600 per veteran.

The idea of subsidized jobs is not new for the federal government. Although prevalent only for limited period of times, over the last five decades, subsidy programs have increasingly been used in order to improve employment prospects of certain groups considered to be economically disadvantaged. The specific target groups have generally included low-income youth, workers who are recipients of federal assistance programs, ex-felons and veterans who are members of families receiving public assistance. However, for the first time, the VOW Act was, particularly, designed to improve the labor market performance of veterans by offering wage subsidies to potential employers.

Figure 2.1 presents the rate of unemployment, calculated as a share of civilian labor force ages 18 to 30, by veteran status. Starting after the recent recession in 2007, rate of unemployment for veterans and non-veterans increase with same pace, but starting in 2010 unemployment rate of veterans deviate from the unemployment rate of non-veterans. Figure 2.2 presents the employment rates, calculated as a share of civilian population ages 18 to 30, by veteran status. As a measure of success in the labor market, rate of employment is also important, since long-lasting unemployment may discourage workers from searching for job.

This chapter relies on time to identify the effect of the legislation using Integrated Public Use Micro-data samples from the Current Population Survey from 2010 to 2013. The VOW Act was passed in late November 2011, and it is assumed the legislation has no effect in December.

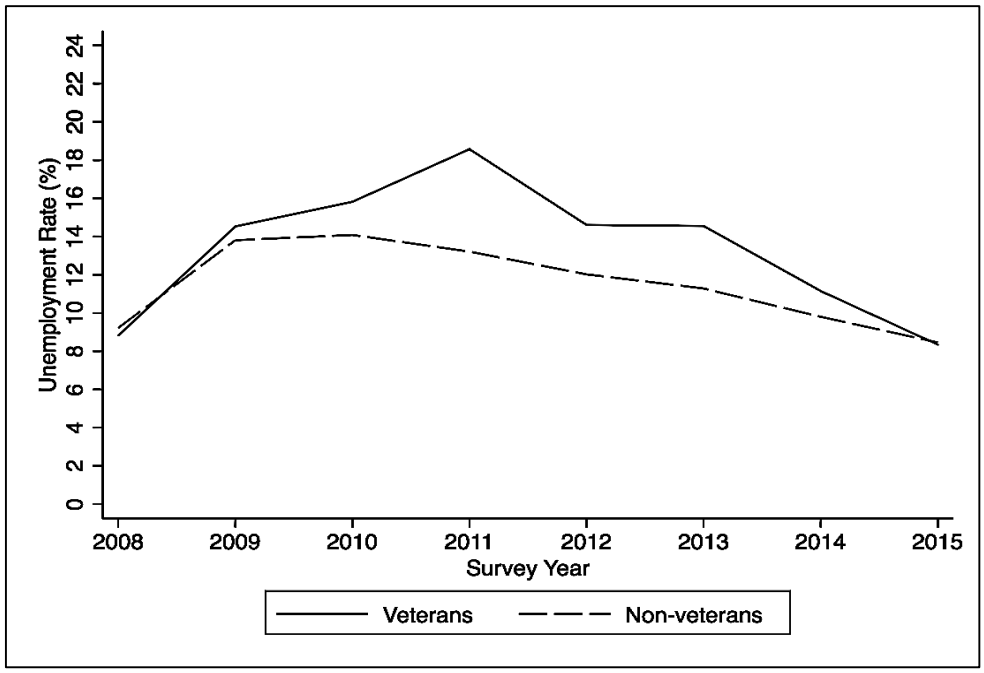

Figure 2.1 Rate of Unemployment by Veteran Status

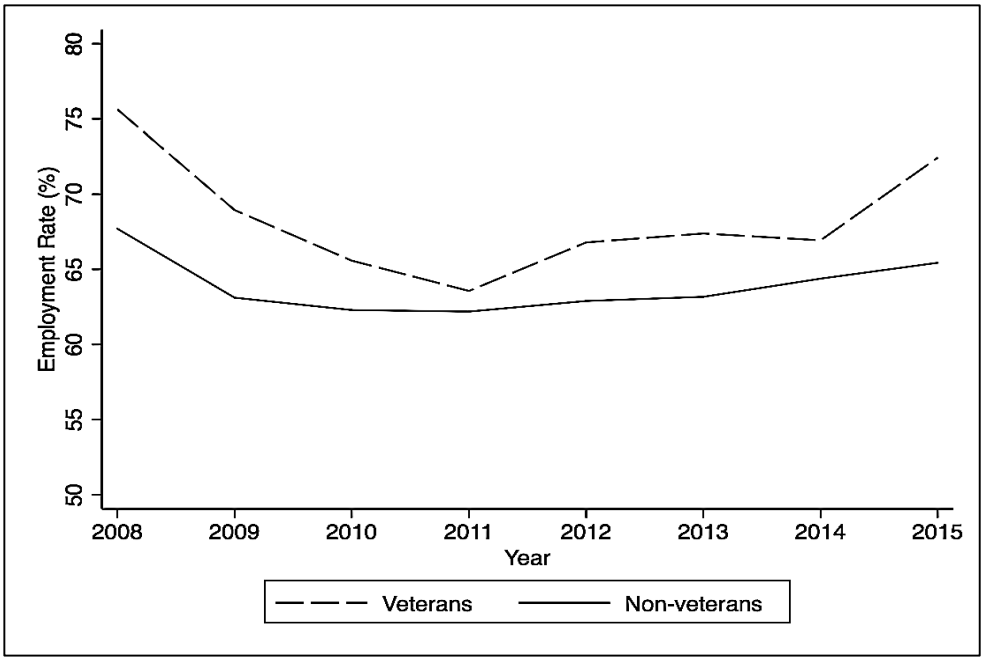

Figure 2.2 Rate of Employment by Veteran Status

Note: Calculations use weighted samples from Integrated Public Use Micro-data from Current Population Survey. Unemployment rate defined as the ratio of unemployed in the labor force, and employment rate is calculated as share of employed to population.

This study examines the causal effect of this legislation on the labor force participation decisions and employment of veterans using quasi-experimental design. The effect of the legislation on employment levels is evaluated by looking at labor force participation, unemployment, employment, weekly hours worked and weekly earning. In contrast to previous findings in related literature, this chapter shows evidence that the VOW Act, as a wage subsidy program, lead to an increase in the employment of veterans on the extensive margin and average weekly hours worked on the intensive margin as compared to non-veterans. On the other hand, I find that the employment gain from the legislation does not lead to an increase in earnings.

The remainder of the chapter is designed as follows: I begin with summarizing the previous findings on the subsidy programs in Section II. Section III describes the data. Section IV explains the empirical strategy and presents the empirical findings. And finally, Section V presents conclusions.

2.2 Literature Review

As a legislative tool, public assistance programs have been used to improve the economic conditions of certain target groups. Some of these support programs offered financial incentives directly to individuals in order to encourage them to participate more in the labor force. One of the popular supply-side subsidies is the Earned Income Tax Credit (EITC). The EITC was started in 1986 and targeted working individuals and couples, particularly, those with children. Studies have shown that the EITC promotes labor force participation and employment among eligible single women with children (Eissa & Liebman, 1996; Meyer & Rosenbaum, 2001).

Alternatively, another type of federal intervention has offered wage subsidies in the form of a tax credit to employers for hiring members of targeted groups, considered to have difficulty

finding jobs. On the demand side of the labor market, employer subsidy programs have been designed to lower the cost of hiring the target groups so that employers favor members of targeted groups at the expense of ineligible workers. The Targeted Jobs Tax Credit (TJTC), which was popular in the 1980s, was found to increase employment of young workers by over 10 percent (Bishop & Montgomery, 1993). In contrast, the experimental study by Burtless (1985) indicates that exposing workers as subsidized by the government reduces the chance of employment through stigmatizing effect. He explains that workers participating the subsidy programs would be considered as "damaged goods" by the employers and thus, workers would be disadvantaged as compared to ineligible applicants.

In 1996, as a sequel to the TJTC, the Work Opportunity Tax Credit (WOTC) was created with a few improvements; for example, only new hires would be eligible for the subsidy and they need to work for a certain period of time to be eligible for the credit. It is a federal hiring tax subsidy program like the TJTC and designed to expand employment among specific targeted groups. Although started in 1996 and extended several times, there is little research about how effective the program increases the employment of targeted groups. Hamersma (2003, 2005, 2008) shows evidence that the WOTC had low participation rate and thus, led to little impact on the employment among targeted workers. Using the expansion of the WOTC on disabled veterans in 2007, Heaton (2012) shows that the WOTC expanded employment among disabled veterans.

Regarding the limited literature on the effectiveness of hiring tax subsidy programs on the employment of targeted workers, this paper is the first examination of the VOW Act on the labor outcomes of the veterans, which was particularly designed to improve the employment prospects of veterans.

2.3 Data and Summary Statistics

Data for this study comes from basic monthly Current Population Survey (CPS) Integrated Public Use Microdata Samples (IPUMS) from 2010 to 2013 (Flood, King, Ruggles, & Warren, 2015). The CPS is the main source of national labor force statistics in the U.S., surveying about 60,000 households each month. It provides the usual monthly labor force information on the U.S. population.

The employment analytic sample is restricted to those aged 18 to 30 since this group is more likely to be in the labor force. This data set is useful because it provides information on the veteran and disability status of individuals. Veterans are identified in the data as those who previously served in the active duty component of the U.S. Armed Forces and are presently in civilian life. Although not identified explicitly in the data, this age group represents mostly the veterans who served during overseas deployments since 2001.

The impact of the VOW Act is measured by five outcomes: labor force participation, unemployment, employment, weekly hours of work and weekly earnings. Each outcome is analyzed in separate analytic samples. For all samples, I exclude any individual who is self-employed for they are less likely to be affected by the legislation. The analytic sample I analyzed the impact of the VOW Act on usual weekly hours worked is further restricted those who are employed and who have strictly positive working hours. And the sample used to analyze the weekly earnings is also restricted to those who are employed and who have strictly positive weekly earnings.

The effect of the legislation on the labor outcomes of the veterans is examined by comparing the average outcomes before and after the legislation. This empirical approach,

namely difference-in-differences approach uses control and treatment groups. For a credible comparison, this study uses non-veterans as the control group and veterans as the treatment group in all sub-samples. Empirical method relies on the assumption that control and treatment groups have common trend in the absence of the treatment, that is in pre-policy years.

Descriptive statistics organized by gender, veteran status, and disability status are reported in Table 2.1. It presents the mean values of the characteristics of the control and treatment groups. There are marked differences across sub-populations. Male veterans without disability have higher labor force participation rate than male non-veterans however, there is little difference between female veterans and non-veterans. Labor force participation is similar among those with disability. Except for females without a disability, all sub-samples of veterans have higher employment rate, but female veterans without a disability have lower employment rate than female non-veterans without a disability. Once participating in the labor force, veterans have a higher rate of unemployment in all subsamples except among males with disability. On the other hand, veterans have higher usual hours of work weekly. Weekly earnings are adjusted for inflation using CPI factors and they are in 2014 dollars. Weekly earnings variable is available only for quarter of the data, that is for those, Merged Outgoing Rotation Group, who are in their fourth month in the survey sample. Similar to employment rates, veterans earn more than non veterans in all sub-samples except for female veterans without a disability. On average, veterans are older and have higher rate of some college degree but a lower rate of high school degree. As for bachelor or higher degree, except male veterans with disability all sub-samples of non-veterans have higher rate. In all groups, veterans are more likely to be married and divorced or widowed than non-veterans. Veterans are also more likely to be white or black, but less likely to be Hispanic.

Table 2.1 Summary Statistics by Disability Status and Gender

Variables	Without disability				With disability			
	Females		Males		Females		Males	
	Non-veteran	Veteran	Non-veteran	Veteran	Non-veteran	Veteran	Non-veteran	Veteran
Labor force participation	0.68	0.67	0.78	0.83	0.40	0.43	0.41	0.56
Employment	0.61	0.57	0.67	0.71	0.30	0.32	0.30	0.41
Unemployment	0.11	0.15	0.13	0.15	0.24	0.25	0.26	0.26
Weekly Hours Worked	34.36	37.61	38.01	41.07	30.98	34.01	33.26	40.25
Weekly Earnings ($)	537.25	643.53	658.75	772.52	413.54	1060.28	486.59	656.61
Age	23.97	26.66	23.84	26.43	24.31	26.66	23.74	26.59
< High School	0.12	0.01	0.15	0.02	0.23	0.04	0.28	0.05
High School/GED	0.26	0.24	0.31	0.37	0.37	0.18	0.44	0.38
Some College	0.39	0.56	0.35	0.49	0.31	0.75	0.22	0.47
BA+	0.24	0.19	0.19	0.12	0.09	0.03	0.06	0.09
Enrolled in school	0.27	0.13	0.25	0.12	0.18	0.21	0.18	0.13
Married	0.26	0.50	0.19	0.37	0.16	0.42	0.10	0.41
Divorced/Widowed	0.05	0.19	0.03	0.13	0.09	0.32	0.04	0.20
Never Married	0.69	0.31	0.79	0.50	0.75	0.26	0.86	0.40
White, non-hispanic	0.58	0.60	0.57	0.67	0.61	0.53	0.61	0.72
Black, non-hispanic	0.14	0.18	0.13	0.13	0.16	0.28	0.16	0.08
Other, non-hispanic	0.08	0.07	0.08	0.06	0.07	0.12	0.06	0.07
Hispanic	0.19	0.15	0.22	0.15	0.15	0.07	0.17	0.14
Urban residence	0.72	0.61	0.73	0.68	0.64	0.59	0.65	0.58
N	499,307	3,230	455,184	13,015	18,196	289	19,858	1,139

Note: Calculations are weighted with IPUMS-CPS sampling weights. Weekly hours worked and weekly earnings are calculated conditional on employment with positive weekly working hours and positive weekly earnings. Weekly earnings are in 2014 dollars, adjusted for inflation with CPI factor.

2.4 Method and Results

2.4.1 Difference Model

The main goal of this paper is to estimate the causal effect of the VOW Act 2011 on the employment outcomes of the veterans. I will start my analysis comparing average labor force participation and employment levels of the veterans before and after 2011. The Hiring Veterans Act was put into effect in late November in 2011. For this purpose, I estimate the following linear probability model among only veterans:

$$Y_{it} = \alpha + \beta_1 d_t + \beta_2 Z_{it} + \varepsilon_{it}, \quad (1)$$

where i denotes individuals and t denotes time; Y_{it} is the outcome of interest for individual i in period t, t=0, 1; d_t is a dummy variable equals 1 for post-2011 years; and Z_{it} is a set of demographic control variables, including age, three educational levels, race or ethnicity dummies, marital status, urban status, presence of a child ages less than six years old, whether enrolled in school and state and year dummies. β_1 is the average effect of the new legislation on the labor outcomes for veteran.

The key assumption in this model is that, if there were no legislation, β_1 would be zero. As reported in Table 2.1, there are demographical differences between male and female veterans. For the accuracy of the treatment effect, in each regression I control for these demographic differences. Average differences in outcomes could be computed as $\Delta\overline{U} = \overline{U}_1 - \overline{U}_0$, but in that case I could not adjust standard errors for probable heteroskedasticity and could not adjust for demographic differences.

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Table 2.2 Initial Results in Difference Model

	Dependent Variable: Labor Force Participation				Dependent Variable: Employment			
	Without Disability		With Disability		Without Disability		With Disability	
Variables	**Women**	**Male**	**Women**	**Male**	**Women**	**Male**	**Women**	**Male**
Post2011	0.058*	0.065***	0.249*	0.034	0.079**	0.088***	0.313**	0.115*
	(0.027)	(0.010)	(0.123)	(0.052)	(0.028)	(0.013)	(0.095)	(0.049)
Age	-0.063	-0.028	-0.007	-0.072	-0.096	-0.054*	0.075	-0.159
	(0.056)	(0.023)	(0.260)	(0.096)	(0.058)	(0.027)	(0.230)	(0.089)
AgeSQ	0.001	0.001	-0.001	0.001	0.002	0.001*	-0.002	0.003
	(0.001)	(0.000)	(0.005)	(0.002)	(0.001)	(0.001)	(0.004)	(0.002)
< High school	-0.264*	-0.096**	-0.205	-0.029	-0.283**	-0.045	-0.643***	-0.023
	(0.109)	(0.029)	(0.177)	(0.076)	(0.101)	(0.033)	(0.147)	(0.070)
Some college	0.081***	-0.031***	0.226	0.031	0.100***	-0.006	-0.107	0.006
	(0.024)	(0.008)	(0.130)	(0.039)	(0.025)	(0.010)	(0.087)	(0.037)
BA+	0.222***	0.020	0.380	0.016	0.241***	0.074***	-0.062	0.097
	(0.029)	(0.011)	(0.217)	(0.069)	(0.031)	(0.014)	(0.179)	(0.069)
Enrolled in school	-0.232***	-0.263***	-0.016	-0.107	-0.235***	-0.236***	-0.071	-0.121*
	(0.033)	(0.015)	(0.121)	(0.061)	(0.032)	(0.016)	(0.102)	(0.057)
Married	-0.218***	0.062***	0.077	0.064	-0.214***	0.102***	0.162*	0.159***
	(0.021)	(0.008)	(0.100)	(0.042)	(0.023)	(0.010)	(0.078)	(0.041)
Divorced/Separated	-0.032	0.044***	-0.009	0.020	-0.043	0.068***	0.167	-0.061
	(0.025)	(0.012)	(0.160)	(0.050)	(0.028)	(0.014)	(0.136)	(0.049)
Black, Non-hispanic	0.007	-0.041**	-0.236	-0.162*	-0.074**	-0.091***	-0.099	-0.140*
	(0.027)	(0.013)	(0.130)	(0.073)	(0.028)	(0.016)	(0.099)	(0.071)
Other, Non-hispanic	-0.040	-0.013	-0.360**	-0.023	-0.061	-0.005	-0.393***	0.018
	(0.038)	(0.017)	(0.110)	(0.077)	(0.041)	(0.020)	(0.079)	(0.069)
Hispanic	0.035	0.008	-0.199	-0.011	-0.036	-0.017	-0.393*	-0.033
	(0.029)	(0.012)	(0.210)	(0.063)	(0.029)	(0.015)	(0.163)	(0.059)
Urban residence	-0.020	0.003	0.084	0.140***	0.011	0.013	-0.055	0.182***
	(0.023)	(0.008)	(0.112)	(0.038)	(0.023)	(0.010)	(0.098)	(0.036)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE		Yes		Yes		Yes		Yes
Constant	1.640*	1.180***	0.452	1.351	1.849*	1.175***	-0.881	2.196
	(0.730)	(0.291)	(3.291)	(1.225)	(0.753)	(0.347)	(2.895)	(1.128)
Observation	3,230	13,015	289	1,139	3,230	13,015	289	1,139
R-SQ	0.160	0.090	0.503	0.176	0.156	0.090	0.577	0.218

Note: Robust standard errors are reported in parentheses. Calculations use given IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.05, ** p<0.01, *** p<0.001.

Table 2.2 reports ordinary least squares (OLS) estimates of equation (1), which is a linear probability model. Dependent variables are binary variable, 1 if the individual is in the labor force or employed. The coefficient of interest is a time dummy variable, Post2011, which is equal to one for the years after the legislation. It gives the average impact of the VOW Act on labor force participation of the veterans and employment of veterans.

The results in the Table 2.2 suggest that female veterans without disability increased labor participation by about 5 percentage points and female veterans with disabled increased their labor force participation by about 24 percentage points after the VOW Act became effective. As for the employment, results suggest that all veterans increase their chances of employment significantly as compared to pre-2011 period. The highest increase is among veterans with disability, female veterans by about 31 percentage points and male veterans by about 11 percentage points. And veterans without disability are more likely to be employed by about 8 percentage points as compared to pre-2011 period.

2.4.2 Difference-in-Differences Approach

In a simple difference model, for a credible comparison, I assume that veterans are comparable over the years (2010 to 2013), meaning that veterans have the same influences overtime, such as other changes in the labor market, or trends in outcome.

In order to leave out these to internal validity, I can use an untreated control group that does not receive the treatment but experiences all other influences that affect the veterans in the labor market. Since the VOW Act does not directly affect employment levels of non-veterans, and I can use non-veterans as a control group for veterans.

In order to achieve this goal, I will use difference in differences model, as following:

$$Y_{it} = \beta_1 + \beta_2 Vet_i + \beta_3 d_t + \beta_4 (Vet_i \, x \, d_t) + \beta_5 Z_{it} + \varepsilon_{it}, \quad (2)$$

where Y_{it} is the outcome variables, labor force participation, employment, weekly usual hours worked and log of weekly earnings; Vet_i is dummy variable for the veteran status; d_t is time dummy variable for post legislation period. In this model, difference in differences estimator, β_4 is the causal effect of the new legislation on the outcomes of the veterans. I estimate this model using ordinary least squares (OLS). Again the key assumption is that β_4 is zero if there were no legislation, implicitly saying that two groups, veterans and non-veterans have the same trends overtime. Without controlling for demographic variables, estimate of β_4 can be obtained by $\Delta\overline{U} = (\overline{U}_1 - \overline{U}_0)^1 - (\overline{U}_1 - \overline{U}_0)^0$. This says the same as subtracting differences in the control group from the differences in the treatment group. Since both groups are assumed to have common trends and influences, this gives the net effect of the legislation.

2.4.3 Estimation Results

2.4.3.1 Labor Force Participation

Table 2.3 reports the OLS estimates of the equation (2) for the labor force participation outcome. Here in this model, variable of interest is the interaction term of veteran status and post2011 time dummy variable. For each subsample, I estimate two models, with and without controlling for demographic control variables. Each regression includes year fixed effects for there are multiple years. Results suggest that the VOW Act has significant positive effect on the labor force participation of veterans without disability. Female veterans without a disability increase their labor force participation by about 5 percentage points as compared to control group, female non-veterans without disability, when controlled for demographic differences. And male veterans without disability have an increase of about 3 percentage points. On the other

Table 2.3 Estimation Results of Labor Force Participation

	Without disability				With disability			
	Female		Male		Female		Male	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Veteran x Post2011	0.016	0.049**	0.022**	0.037***	-0.009	0.079	-0.044	-0.031
	(0.019)	(0.018)	(0.008)	(0.007)	(0.067)	(0.066)	(0.035)	(0.035)
Veteran	-0.020	-0.077***	0.048***	-0.062***	0.030	-0.071	0.175***	0.033
	(0.013)	(0.012)	(0.005)	(0.005)	(0.049)	(0.048)	(0.026)	(0.027)
Post2011	-0.010***	-0.001	-0.001	0.002	-0.065***	-0.023*	-0.004	0.019*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.012)	(0.011)	(0.011)	(0.010)
Age		0.069***		0.125***		-0.023		0.005
		(0.003)		(0.003)		(0.016)		(0.015)
AgeSQ		-0.001***		-0.002***		0.000		-0.000
		(0.000)		(0.000)		(0.000)		(0.000)
<High School		-0.150***		-0.075***		-0.149***		-0.109***
		(0.003)		(0.002)		(0.010)		(0.009)
Some College		0.080***		0.030***		0.196***		0.145***
		(0.002)		(0.002)		(0.010)		(0.010)
BA+		0.154***		0.034***		0.319***		0.291***
		(0.002)		(0.002)		(0.015)		(0.016)
Enrolled in school		-0.246***		-0.350***		-0.095***		-0.111***
		(0.002)		(0.002)		(0.012)		(0.011)
Married		-0.155***		0.051***		-0.012		0.123***
		(0.002)		(0.001)		(0.011)		(0.013)
Divorced/Widowed		-0.018***		0.012***		-0.053***		0.030
		(0.003)		(0.003)		(0.014)		(0.018)
Black, non-hispanic		-0.027***		-0.070***		0.000		-0.120***
		(0.002)		(0.002)		(0.012)		(0.011)
Other, non-hispanic		-0.115***		-0.078***		0.009		-0.040***
		(0.003)		(0.003)		(0.016)		(0.016)
Hispanic		-0.036***		0.028***		0.001		-0.006
		(0.002)		(0.002)		(0.013)		(0.012)
Urban residence		-0.002		-0.006***		0.026**		0.006
		(0.002)		(0.001)		(0.009)		(0.009)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE		Yes		Yes		Yes		Yes
Constant	0.692***	-0.156***	0.775***	-0.741***	0.438***	0.785***	0.416***	0.363**
	(0.001)	(0.036)	(0.001)	(0.032)	(0.008)	(0.194)	(0.008)	(0.179)
N	502537	502537	468199	468199	18485	18485	20997	20997
R-SQ	0.001	0.132	0.001	0.237	0.002	0.114	0.005	0.110

Note: Robust standard errors are reported in parentheses. Calculations use given IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.05, ** p<0.01, *** p<0.001.

Table 2.4 Estimation Results of Employment to Population

	Without disability				With disability			
	Female		Male		Female		Male	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Veteran x Post2011	-0.003	0.021	0.023*	0.032***	0.089	0.168**	0.033	0.043
	(0.020)	(0.019)	(0.009)	(0.009)	(0.063)	(0.061)	(0.034)	(0.033)
Veteran	-0.035**	-0.097***	0.023***	-0.100***	-0.032	-0.121**	0.090***	-0.061**
	(0.013)	(0.013)	(0.007)	(0.006)	(0.044)	(0.044)	(0.026)	(0.026)
Post2011	0.004	0.017***	0.012***	0.022***	0.005	-0.006	0.024*	0.027***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.011)	(0.010)	(0.010)	(0.010)
Age		0.078***		0.137***		-0.002		0.037***
		(0.003)		(0.003)		(0.014)		(0.014)
AgeSQ		-0.001***		-0.002***		-0.000		-0.001**
		(0.000)		(0.000)		(0.000)		(0.000)
<High School		-0.164***		-0.086***		-0.158***		-0.106***
		(0.003)		(0.002)		(0.008)		(0.008)
Some College		0.102***		0.064***		0.160***		0.119***
		(0.002)		(0.002)		(0.010)		(0.010)
BA+		0.194***		0.098***		0.317***		0.276***
		(0.002)		(0.002)		(0.015)		(0.017)
Enrolled in school		-0.184***		-0.261***		-0.050***		-0.033***
		(0.002)		(0.002)		(0.011)		(0.010)
Married		-0.125***		0.090***		-0.025*		0.135***
		(0.002)		(0.002)		(0.011)		(0.012)
Divorced/Widowed		-0.029***		0.018***		-0.049***		0.006
		(0.004)		(0.004)		(0.013)		(0.017)
Black, non-hispanic		-0.092***		-0.139***		-0.046***		-0.124***
		(0.002)		(0.003)		(0.011)		(0.010)
Other, non-hispanic		-0.125***		-0.084***		-0.031*		-0.041***
		(0.003)		(0.003)		(0.015)		(0.014)
Hispanic		-0.044***		0.028***		-0.016		-0.024**
		(0.002)		(0.002)		(0.012)		(0.011)
Urban residence		0.004*		0.002		0.025**		0.011
		(0.002)		(0.002)		(0.008)		(0.008)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE		Yes		Yes		Yes		Yes
Constant	0.602***	-0.418***	0.667***	-1.100***	0.297***	0.382*	0.287***	-0.234
	(0.002)	(0.037)	(0.002)	(0.036)	(0.008)	(0.176)	(0.007)	(0.163)
N	502,537	502,537	468,199	468,199	18,485	18,485	20,997	20,997
R-SQ	0.001	0.128	0.000	0.193	0.002	0.123	0.003	0.118

Note: Robust standard errors are reported in parentheses. Calculations use given IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.05, ** p<0.01, *** p<0.001.

Table 2.5 Estimation results of Unemployment

	Without disability				With disability			
	Female		Male		Female		Male	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Veteran x Post2011	0.025	0.031	-0.003	-0.001	-0.223*	-0.216*	-0.111**	-0.119**
	(0.018)	(0.018)	(0.008)	(0.008)	(0.092)	(0.092)	(0.042)	(0.042)
Veteran	0.027*	0.041***	0.021***	0.056***	0.122	0.160*	0.065	0.157***
	(0.012)	(0.012)	(0.006)	(0.006)	(0.072)	(0.073)	(0.034)	(0.034)
Post2011	-0.010***	-0.008***	-0.016***	-0.015***	0.015	0.008	-0.035*	-0.046**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.016)	(0.016)	(0.015)	(0.015)
Age		-0.043***		-0.076***		-0.042		-0.105***
		(0.003)		(0.003)		(0.024)		(0.022)
AgeSQ		0.001***		0.001***		0.001		0.002***
		(0.000)		(0.000)		(0.000)		(0.000)
<High School		0.089***		0.049***		0.239***		0.115***
		(0.003)		(0.003)		(0.022)		(0.017)
Some College		-0.047***		-0.052***		-0.030*		-0.015
		(0.002)		(0.002)		(0.013)		(0.012)
BA+		-0.072***		-0.077***		-0.117***		-0.057***
		(0.002)		(0.002)		(0.016)		(0.016)
Enrolled in school		-0.046***		-0.046***		-0.047**		-0.113***
		(0.002)		(0.002)		(0.017)		(0.017)
Married		-0.014***		-0.049***		0.023		-0.073***
		(0.001)		(0.001)		(0.016)		(0.014)
Divorced/Widowed		0.018***		-0.009*		0.008		0.035
		(0.003)		(0.004)		(0.022)		(0.024)
Black, non-hispanic		0.100***		0.116***		0.119***		0.133***
		(0.002)		(0.003)		(0.019)		(0.021)
Other, non-hispanic		0.029***		0.020***		0.081***		0.033
		(0.002)		(0.002)		(0.023)		(0.023)
Hispanic		0.018***		-0.011***		0.033		0.035*
		(0.002)		(0.002)		(0.019)		(0.018)
Urban residence		-0.010***		-0.010***		-0.013		-0.018
		(0.002)		(0.002)		(0.013)		(0.012)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE		Yes		Yes		Yes		Yes
Constant	0.121***	0.748***	0.139***	1.210***	0.232***	0.783**	0.279***	1.788***
	(0.001)	(0.035)	(0.001)	(0.036)	(0.011)	(0.295)	(0.011)	(0.269)
N	350,838	350,838	367,536	367,536	7,774	7,774	9,363	9,363
R-SQ	0.001	0.054	0.002	0.059	0.001	0.087	0.002	0.081

Note: Robust standard errors are reported in parentheses. Calculations use IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.05, ** p<0.01, *** p<0.001.

hand, I find no effect on the labor force participation of veterans with a disability. Female veterans without disability results are sensitive to demographic controls because when I do not for demographic differences, I find no significant effect on labor force participation.

2.4.3.2 Employment to Population

To further examine the impact of the VOW act on the employment of veterans, I estimate the equation (2) for the employment outcome. The dependent variable is binary that equals 1 if the individual is employed, and I estimate a linear probability model. According to the results reported in Table 2.4, male veterans without a disability and female veterans with a disability increase their chances of employment as compared to their respective control groups. The effect of the VOW act is highest among the female veterans with disability, by around 17 percentage points, and male veterans without disability increase chances of employment by up to 3.2 percentage points. Although the results are robust to demographic differences for male veterans without disability because there is little change in the effect after I add demographic control variables in the model. However, I find no effect for the female veterans with disability if I exclude demographic controls. Apart from these results, I find no evidence that there is any effect on employment of female veterans without disability and male veterans with disability.

2.4.3.3 Unemployment

The effect of the VOW Act on unemployment is examined using equation (2). Outcome variable is unemployed if an individual is unemployed. I estimate these linear probability model by OLS. Table 2.5 reports the estimates of unemployment outcome. Results suggest that the VOW Act has no effect on the veterans without a disability. As for the veterans with a disability, they have lowered their unemployment significantly. The highest change is among female veterans by about 20 percentage points and it is about 11 percentage points for male veterans

without a disability. The results for both veterans with and without a disability is robust to demographic differences.

2.4.3.4 Weekly Hours of Work

Another aspect of the VOW Act is whether this employment gain translates into intensive labor and higher earnings for the veterans. I now examine the impact of the VOW act on the weekly hours of work of the veterans in the same estimation setting. For this analysis, sample is restricted to those who are employed and have positive working hours. The results reported in Table 2.5 suggest that the VOW act increased the hours of work of the veterans with disability, only when controlled for demographic differences. Among those with a disability, female veterans have increased their weekly working hours by on average 7 hours and male veterans have increased their weekly working hours by about 3 hours after controlling for demographic differences. On the other hand, I find no effect on the weekly working hours of veterans without a disability.

2.4.3.5 Weekly Earnings

And finally, the last outcome estimated is the log of weekly earnings. Earnings are adjusted for inflation and are in 2014 dollars. For estimating the log of weekly earnings, sample is restricted to those who are employed and with positive earnings. Estimation results of the equation (2) by OLS are reported in Table 2.6. Results suggest that there is no significant effect of the VOW Act on the weekly earnings of the veterans. Although, to some extent, the VOW Act has lead to positive changes in all employment outcomes but results suggest that this employment gain does not translate into monetary gain.

Table 2.6 Estimation Results of Weekly Hours Worked

	Without disability				With disability			
	Female		Male		Female		Male	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Veteran x Post2011	-0.506	0.201	-0.236	0.286	5.435	7.514**	0.275	2.718**
	(0.527)	(0.521)	(0.291)	(0.277)	(2.923)	(2.751)	(1.322)	(1.336)
Veteran	3.725***	0.946*	3.193***	0.339	0.095	-2.526	6.917***	1.396
	(0.380)	(0.373)	(0.203)	(0.196)	(2.467)	(2.260)	(1.046)	(1.069)
Post2011	0.089	0.420***	0.382***	0.707***	0.239	0.155	-0.579	-0.973*
	(0.067)	(0.058)	(0.068)	(0.059)	(0.519)	(0.491)	(0.555)	(0.507)
Age		4.938***		4.562***		3.140***		0.460
		(0.091)		(0.094)		(0.811)		(0.755)
AgeSQ		-0.089***		-0.081***		-0.058***		-0.001
		(0.002)		(0.002)		(0.016)		(0.015)
<High School		-2.366***		-1.427***		-1.569*		0.036
		(0.095)		(0.075)		(0.746)		(0.609)
Some College		-0.173**		-0.419***		1.637***		3.844***
		(0.056)		(0.055)		(0.438)		(0.435)
BA+		3.133***		1.574***		7.182***		7.370***
		(0.060)		(0.061)		(0.543)		(0.677)
Enrolled in school		-8.068***		-10.108***		-5.888***		-8.081***
		(0.070)		(0.079)		(0.575)		(0.636)
Married		-0.377***		2.052***		1.539**		4.421***
		(0.051)		(0.052)		(0.504)		(0.480)
Divorced/Widowed		0.640***		1.230***		3.530***		1.554**
		(0.093)		(0.125)		(0.648)		(0.752)
Black, non-hispanic		0.221**		-1.791***		2.645***		0.645
		(0.071)		(0.082)		(0.605)		(0.715)
Other, non-hispanic		-0.179*		-1.322***		2.866***		-1.077
		(0.088)		(0.087)		(0.676)		(0.734)
Hispanic		0.628***		-0.325***		1.930***		0.593
		(0.063)		(0.062)		(0.551)		(0.595)
Urban residence		0.368***		-0.850***		0.482		-1.601***
		(0.052)		(0.055)		(0.437)		(0.428)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE		Yes		Yes		Yes		Yes
Constant	34.36***	-30.960***	37.63***	-22.17***	31.3***	-14.24	33.39***	24.11***
	(0.047)	(1.129)	(0.048)	(1.166)	(0.369)	(9.841)	(0.394)	(9.351)
N	312,675	312,675	319,768	319,768	5,925	5,925	7,008	7,008
R-SQ	0.001	0.244	0.002	0.237	0.003	0.166	0.016	0.183

Note: Robust standard errors are reported in parentheses. Calculations use given IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.05, ** p<0.01, *** p<0.001.

Table 2.7 Estimation Results of Log of Weekly Earnings

	Without disability				With disability			
	Female		Male		Female		Male	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Veteran x Post2011	-0.057	-0.003	-0.043	0.008	-0.348	-0.147	-0.195	0.029
	(0.070)	(0.062)	(0.034)	(0.028)	(0.397)	(0.368)	(0.123)	(0.135)
Veteran	0.303***	0.077	0.256***	0.032	0.726**	0.464	0.637***	0.097
	(0.047)	(0.042)	(0.024)	(0.020)	(0.281)	(0.289)	(0.080)	(0.104)
Post2011	-0.035***	-0.021**	-0.034***	-0.025***	0.024	-0.007	0.004	-0.062
	(0.009)	(0.007)	(0.009)	(0.007)	(0.067)	(0.061)	(0.078)	(0.071)
Age		0.218***		0.192***		-0.015		0.042
		(0.011)		(0.011)		(0.091)		(0.107)
AgeSQ		-0.003***		-0.003***		0.001		-0.000
		(0.000)		(0.000)		(0.002)		(0.002)
<High School		-0.217***		-0.202***		-0.215**		-0.130
		(0.011)		(0.008)		(0.073)		(0.080)
Some College		0.028***		0.008		0.102*		0.272***
		(0.007)		(0.006)		(0.050)		(0.057)
BA+		0.341***		0.306***		0.541***		0.633***
		(0.008)		(0.008)		(0.078)		(0.094)
Enrolled in school		-0.396***		-0.478***		-0.372***		-0.354***
		(0.008)		(0.009)		(0.080)		(0.068)
Married		0.031***		0.126***		0.107		0.316***
		(0.006)		(0.006)		(0.058)		(0.059)
Divorced/Widowed		0.013		0.048***		0.260***		0.192*
		(0.012)		(0.013)		(0.075)		(0.112)
Black, non-hispanic		-0.033***		-0.152***		0.110		-0.212
		(0.008)		(0.009)		(0.074)		(0.130)
Other, non-hispanic		-0.019		-0.031**		0.147		-0.057
		(0.011)		(0.011)		(0.077)		(0.097)
Hispanic		-0.020*		-0.081***		0.118		0.010
		(0.008)		(0.007)		(0.065)		(0.069)
Urban residence		0.081***		0.030***		0.153**		-0.029
		(0.006)		(0.006)		(0.055)		(0.052)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE		Yes		Yes		Yes		Yes
Constant	6.018***	2.890***	6.214***	3.413***	5.678***	5.841***	5.759***	5.891***
	(0.006)	(0.159)	(0.006)	(0.143)	(0.046)	(1.099)	(0.058)	(1.364)
N	78,546	78,546	79,981	79,981	1,527	1,527	1,767	1,767
R-SQ	0.001	0.394	0.003	0.392	0.007	0.267	0.020	0.291

Note: Robust standard errors are reported in parentheses. Earnings are adjusted for inflation and are in 2014 dollars. Even number regressions also include industry, occupation fixed effects and control for private sector. Calculations use given IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.05, ** p<0.01, *** p<0.001.

2.4.4 Placebo Estimates

For a credible result in difference-in-differences method, I mention earlier that the control and treatment groups, veterans and non-veterans, are expected to have parallel trend in the labor outcomes in the absence of the treatment. This is saying that in the pre-policy years, under all the influences affecting the labor market conditions, outcomes of the control and treatment group change similarly and all these effects and changes in the labor market affect both groups in the same way. However, it is possible that labor outcomes of the groups, veterans and non-veterans, may be different from year to year and the main results of this study may be measuring one of these changes, which are indeed not the real effect of the legislation.

The parallel trend assumption can be tested through estimating the equation (2) on data for earlier years of the legislation, following the practice of Slusky (2015). Since disability status is available in the monthly CPS only after 2008, I start estimating placebo regressions comparing average outcomes of the year couples 2008 and 2009, 2009 and 2010, and lastly 2010 and 2011 in same sub-samples and treatment and control groups. These difference-in-difference regressions assume that there was legislation put into effect in the end of the first year of year-couple. We are interested in whether the difference-in-differences coefficient is significant or not, rather than the sign of it. If the coefficient of veteran-year interaction is significant, then it suggests that the outcome of one group changed differently in that period and may concern our main results.

There are 5 outcomes, 3 veteran-year interactions for each outcome and it makes 15 tests for each sub-samples. I would expect less than 10% of the tests for each group to be significant, otherwise it would make us question the main results. For the females without a disability, there is only one significant result at 5 % significance level out of 15 tests; for males without a

disability there is two at 5% and 1 at 0.1%; for females with a disability there is 3 at 1%, 1 at 1% and 2 at 0.1%; for males with a disability there is 1 at 0.1% and 1 at 5%. Although half of the significant results come from the regressions of weekly earnings outcome, most veteran-year interactions are not significant. These test results suggest that it is likely that female veterans with a disability may have different trends than female non-veterans with a disability in the labor market and this makes me question my main results. However, results for the male and female veterans without a disability and male veterans with a disability show that the main results for that groups are the most robust.

Table 2.8 Placebo Estimates for Pre-policy Years

	Without Disability		With Disability	
	Female	Male	Female	Male
Variables	**(1)**	**(2)**	**(3)**	**(4)**
Estimates of Labor Force Participation for Pre-policy Years				
Veteran x Post2008	0.019	-0.016	0.116	0.022
	(0.023)	(0.010)	(0.363)	(0.124)
Veteran x Post2009	-0.044	-0.012	-0.134	-0.023
	(0.024)	(0.011)	(0.103)	(0.051)
Veteran x Post2010	0.020	0.006	-0.001	-0.033
	(0.026)	(0.011)	(0.097)	(0.053)
Estimates of Unemployment for Pre-policy Years				
Veteran x Post2008	-0.005	0.002	-0.753***	0.166**
	(0.019)	(0.010)	(0.095)	(0.059)
Veteran x Post2009	-0.001	0.013	0.037	0.059
	(0.021)	(0.011)	(0.133)	(0.063)
Veteran x Post2010	0.035	0.043***	0.011	-0.022
	(0.024)	(0.012)	(0.143)	(0.067)
Estimates of Employment for Pre-policy Years				
Veteran x Post2008	0.020	-0.019	0.442***	-0.111
	(0.025)	(0.012)	(0.081)	(0.124)
Veteran x Post2009	-0.037	-0.021	-0.109	-0.049
	(0.026)	(0.013)	(0.099)	(0.052)
Veteran x Post2010	-0.007	-0.030*	-0.001	-0.012
	(0.027)	(0.013)	(0.087)	(0.052)
Estimates of Weekly Worked Hours for Pre-policy Years				
Veteran x Post2008	1.457*	0.064	4.736	6.510
	(0.643)	(0.352)	(2.713)	(4.253)
Veteran x Post2009	-0.752	0.493	-0.397	-3.683
	(0.710)	(0.382)	(4.219)	(1.958)
Veteran x Post2010	0.522	-0.626	-9.691*	1.760
	(0.771)	(0.405)	(4.468)	(2.079)
Estimates of Log of Weekly Earnings for Pre-policy Years				
Veteran x Post2008	-0.067	-0.049	0.329**	1.118***
	(0.082)	(0.041)	(0.127)	(0.218)
Veteran x Post2009	0.065	0.108*	0.705**	0.117
	(0.092)	(0.045)	(0.229)	(0.163)
Veteran x Post2010	0.087	-0.073	-1.359**	0.258
	(0.094)	(0.048)	(0.490)	(0.151)

Note: Robust standard errors are reported in parentheses. Calculations use given IPUMS-CPS sampling weights. The Table reports pre-policy years x veteran interactions in regressions that include year fixed effects. Each coefficient is estimated in separate regressions for the dependent variables. Stars indicate significance level, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

2.5 Concluding Remarks

This is the first study to examine the effect of the Veterans Opportunity to Work to Hire Act on the labor market outcomes of the veterans regarding labor force participation, unemployment, employment, weekly working hours and earnings. Empirical results suggest that veterans without disability increase labor force participation by around 4 percentage points. Increase in labor force participation among male veterans without disability lead to higher chances of employment by about 3 percentage points, and female veterans with a disability have the highest increase in employment by about 17 percentage points. Also, unemployment of veterans with a disability decrease at least 10 percentage points. I further show evidence that these employment gains lead to higher number of weekly hours worked of veterans with disability by from 3 to 8 hours on average. And finally, I find that the employment impact of the VOW Act does not translate into higher weekly earnings for the veterans.

Governments have increasingly used wage subsidy programs in order to improve employment prospects of certain groups considered to be economically disadvantaged. The specific target groups have generally included low-income youth, workers who are recipients of federal assistance programs, ex-felons and veterans who are members of families receiving public assistance. However, for the first time, the VOW Act was, particularly, designed to improve the labor market performance of veterans by offering wage subsidies to potential employers.

The findings in this study also has important policy implications. Previous studies show that past wage subsidy programs, such as the WOTC, TJTC, have not been successful to increase employment among targeted groups due to several reasons including stigmatizing effect, low

participation by employers (Burtless, 1985; Hamersma, 2003, 2005, 2008). Unlike previous findings in related literature, this study shows evidence that the VOW Act, as a wage subsidy program, leads to an increase in the employment and decrease in the unemployment of veterans on the extensive margin and increase in average weekly hours worked on the intensive margin as compared to non-veterans. In other words, these findings suggest that as a wage subsidy program the VOW Act is successful and reaches the main goal of increasing employment among veterans. Therefore, unlike the previous ones, the VOW Act is successful and should continue to support the employment of veterans.

Another important implication of my findings is that, since the VOW Act is successful, a more careful investigation on understanding why the VOW Act works on veterans and in general the WOTC programs not working is important. Differences in implementations of these two programs may shed light on the failure of the WOTC programs and these programs might be started again. I believe a thorough examination of the issue would be a fruitful area for future research.

Chapter 3

The Labor Market Performance of Female Veterans

3.1. Introduction

The military, which had been primarily a male occupation, has become a career consideration for women. The representation of women in the military has grown significantly. The proportion of women serving in the military was around 2 percent before the all-volunteer era and has reached 15 percent as of 2014 (Defense, 2014; M. A. Kleykamp, 2010). This change in the demographic profile of the military has labor market implications as veterans' transition into civilian life. According to the Bureau of Labor Statistics, 20 percent of all veterans who served during the recent wartime period were female in 2014. There are more female veterans in the civilian labor force than ever, but there is little research done regarding how they fare in the civilian labor market after they discharge from the military.

The aspects of the military experience have been different over the last decade. The mobility of the U.S. military has increased enormously including large overseas deployments to Iraq and Afghanistan since the 9/11 terrorist attack. The veterans who served on active duty in the overseas war territories during this period has reached 36 percent in 2014 (Labor Statistics, 2016). The veterans of this recent war period return home with higher rates of combat zone experience, as happened in previous war periods like the Vietnam War and World War II. Among many differences in the aspects of the experience they gain, this is a time that the recruits experience combat in the all-volunteer era following a long and relative peacetime period. Moreover, there are more women who have participated in the combat zones than any period of

war in the U.S. military history because not all positions in the military were open to them in previous war periods (Segal & Hansen, 1992).

Figure 3.1 presents the ratio of combat zone experienced veterans aged 18 to 40 by gender. Data comes from the Veteran Supplement to the Current Population Survey. According to the Figure 3.1, the rate of combat zone experience of veterans increases over the years, especially between 2009 and 2012. Reason for such a big increase is possible that the government's decision to withdraw from Iraq and more veterans with combat zone experience return to civilian life starting in 2008 (Obama, 2007). And the gap between the ratios of combat zone experience of female and male veterans decreases as females were allowed to serve in combat zone positions. Besides, they return to the civilian labor force with higher rates of service-connected disability since the Vietnam War ended. Figure 2 presents how the rate of service-connected disability by gender increases during the recent war period.

Exploring and understanding the effects of the recent military experience on female veterans is important as the female veteran population is expected to increase (Veteran Affairs, 2014). And nowadays, the Department of Defense has announced that all combat positions in the military have been opened to women starting in January 2016. It is an important policy-relevant question whether being exposed to a combat zone has any different effect on female veterans as compared to male veterans. Combat experience has implications for the health outcomes of veterans. Veterans with combat experience are more likely to have post-traumatic stress disorder (PTSD) than veterans without combat experience (Cesur et al., 2013; Hoge et al., 2004), and women veterans are more likely to be diagnosed with PTSD than male veterans (Zinzow, Grubaugh, Monnier, Suffoletta-Maierle, & Frueh, 2007).

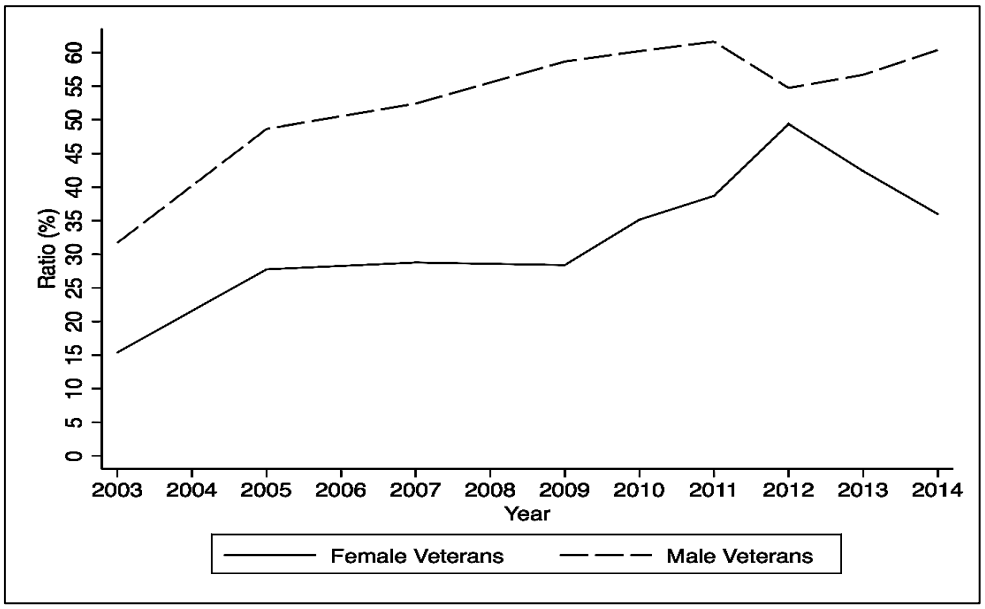

Figure 3.1 Rate of Combat Zone Experience by Gender

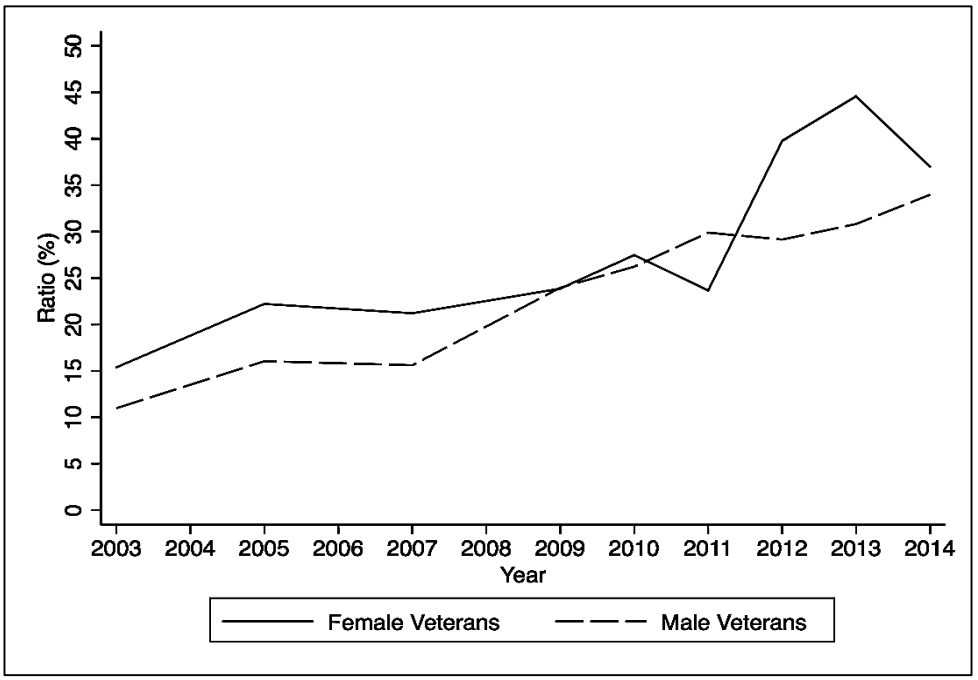

Figure 3.2 Rate of Service-related Disability by Gender

Note: Calculations use samples from Integrated Public Use Micro-data from the Veteran Supplement to the Current Population Survey.

Historically, men served in all combat positions and researchers examined how the military service is related with subsequent civilian labor market performance of the returning veterans, particularly male veterans. Studies find generally positive outcomes for the veterans of World War II, however they find the opposite for the veterans of Vietnam War. On the other hand, considering higher rate of enlistment among female population and the recent war period and its observable effects on female veterans, such as service-related disability and combat zone experience, surprisingly little research exists in the related literature.

Another aspect of military service is that women are often the primary care-giver to children. They have an extra role in the household that is peculiar to women. During their active service in the military, women typically postpone maternity plans because of their military obligations and overseas deployments. One possible explanation for the employment differences among veterans may be presence of young children in the household.

This chapter mainly examines whether recent wartime period and the military service experience have gender differential effects on the subsequent labor force performance of the veterans. Using data from the Veteran Supplement to the Current Population Survey, I estimate models to test whether veterans differ based on gender regarding labor force participation, employment, unemployment and usual weekly hours worked. I find that female veterans are less likely to participate in the labor force, employed and work less than male veterans. Although there are limited studies examined the effect of combat experience on male veterans, to the best of author's knowledge, this study is the first empirical study examining the effect of combat zone experience on female veterans.

The remainder of the chapter is organized as following: Chapter II provides a summary of the studies regarding the labor market outcomes of female veterans, Chapter III describes and explain the data and the method used in the empirical, Chapter IV presents the results of the analysis and Chapter V discusses the findings.

3.2 Previous Studies

There is a considerable amount of research on the labor market impact of the military service on veterans however, most of this literature focuses exclusively on male veterans. The results of the empirical research on the economic returns to the military service are inconclusive. For example, studies find employment and educational premium for the veterans of World War II; however, outcomes are negative for the veterans of the Vietnam War (J. D. Angrist, 1990; J. Angrist & Krueger, 1994; Teachman & Tedrow, 2004; Teachman, 2004a). Most of the reasons for studies being limited to male veterans are the low enlistment rates among women during those years and data availability. However, the presence of women in the U.S. military has increased significantly with the beginning of the all-volunteer era.

There is limited research examining how prior military experience affects civilian labor market outcomes of female veterans. In an empirical study, Stranahan (1998) analyzes the effect of prior military experience on the civilian wages of the early all-volunteer era female veterans, using data from the National Longitudinal Survey of Youth (NLSY). Following the two-step method to correct for potential sample selection bias, the author finds that female veterans benefit from military experience with a wage premium as compared to female non-veterans.

The volunteer army experienced a relatively peaceful period until the 9/11 terrorist attack. Since then, the mobilization of the military has increased significantly. The military has

made large overseas deployments and veterans of this period return to civilian life with large rates of combat experience. The effects of the military training in peacetime and wartime may have a different effect on the human capital of the veterans (Faberman & Foster, 2013).

Some empirical studies on veterans of the post 9/11 period include female veterans in their analysis. Kleykamp (2013) compares the odds of unemployment and earnings between veterans and non-veterans using data from the Current Population Survey of 2005-2011. Using logistic regression and generalized linear models, the author finds that female veterans have higher difficulty finding jobs than male veterans, as compared to non-veterans, but there is no gender difference on wage premium attributed to prior military service. On the other hand, Routon (2014) analyzes the impact of military service on employment outcomes using data from the National Longitudinal Survey of Youth 1997. In this study, female veterans are found to be equally employable with female non-veterans using several empirical methodologies including sibling fixed effects and propensity score matching.

Recent veterans, namely post-9/11 veterans return home with higher rate of combat zone experience, comparable to previous war periods. Combat experience is generally associated with worse health outcomes. Using data from the Panel Study of Income Dynamics from 1968 to 2003, MacLean (2010) shows evidence on the association between combat experience and disability and unemployment of male veterans. Author finds that veterans with combat experience are more likely to have disability and more likely to be unemployed in 1994, estimating logistic regression models.

This paper examines the gender differences in the effects of recent military experience including overseas deployments and combat zone experience on the labor market performance of

the female veterans. The measures of success in the labor market include: labor force participation, unemployment, and usual weekly hours of work. Using data from the Veteran Supplement to the CPS from 2007 to 2013, I estimate labor force participation and unemployment by probit models and hours of work by OLS. I find that females are less likely to participate in the labor force, combat experience has little or no effect and female veterans with combat experience or service-related disability have significantly less likely to participate in the labor force as compared to male veterans with same experience by above 12 percent. On the other hand, female and male veterans are found to be equally employable except for female veterans with combat experience have higher unemployment penalty than comparable male veterans. I find that females work less, combat experience is positively associated with higher work of hours but service-related disability decreases hours of work of veterans.

3.3 Data and Summary Statistics

The Current Population Survey (CPS) is the primary source of labor force statistics in the U.S. and it collects detailed individual-level data from a nationally representative sample of approximately 60,000 households each month. Monthly surveys consist of two sets of questions: the basic monthly demographic and labor questions and month specific supplemental questions. In addition to basic labor force questions, in one month[9] of each year interviewers are asked supplementary questions regarding disability, combat or war zone experience, military branch, year of discharge and length of service (Bureau of Census, 2014).

Veteran supplement data samples are particularly useful for my analysis. In addition to basic demographic and work related information, it collects information regarding veterans' prior

[9] Veteran supplement data are collected in one month every year. For the last 10 years, it surveyed on every August, except in year 2010 it was June.

military experience such as, whether they have combat experience, service-related disability or length of service. In this regard, I pooled the most recent available samples from 2003 to 2014, excluding the years 2008, 2006 and 2004 which are not available. The year 2003 is chosen for the availability of combat zone experience variable, and it reflects the year recent veterans return home.

Veterans come from the all-volunteer era and they served in the active duty component of the military anywhere in the world since 2001. These veterans are subject to overseas deployments in Iraq and Afghanistan. Analytic samples are restricted to those aged 18 to 40 because this age group has high labor force attachment. The lower bound of age limit is set to 18 because there are almost no observations of returning veterans who are 17 years old or younger. For a credible comparison between female and male veterans, upper bound is set to 40, for this age group represents mostly the post-9/11 veterans.

Individuals who are self-employed and those who are currently in the active duty component of armed forces are excluded from my analytical samples for they may be less likely to be affected by the military experience. I impose the age restriction and exclusion of self-employed for the analytic sample for labor force participation and employment. In addition, the sample for unemployment is limited to civilian non-institutional labor force and usual weekly hours of work is limited to those who are employed.

Table 3.1 provides the summary statistics of the characteristics of female and male veterans by combat zone experience. Mean values shows that female veterans are less likely to be in the labor force, have lower employment but higher unemployment and work less weekly hours of work. On average, females with combat zone experience are younger, more likely to

have a service-related disability, have less potential civilian experience[10], more likely to be married to a spouse in armed forces, less likely to be married in general but more likely to be divorced or separated than male veterans with combat zone experience. Also female veterans are more likely to have young child at home, who is less than six years old and on average they have more children at home than male veterans. Although they appear to have lower rates of high school degree, they have higher rate of some college and bachelor or higher degree than all groups.

Table 3.2 compares and tests mean outcomes among sub-samples by age groups, spouse in armed forces, young child at home, combat zone experience, service-related disability status, and race/ethnicity. Among all sub-samples females appear to have a lower labor force participation rate, lower employment rate and lower usual weekly hours of work than males. On the other hand, they have higher unemployment rate among those who are aged 25 to 30. Also among those with combat zone experience, those who have young child at home and those with service-related disability, female veterans have higher unemployment rate than male veterans. Although these raw mean differences between female and male veterans gives understanding but does not control for the compositional differences provided in Table 3.1. In this regard, in the following section in a multivariate regression setting, this study examines the gender differences in the effects of recent military experience on the labor market performance of female veterans. In order to test whether there are differences in the labor outcomes between female and male veterans, I interact female with combat zone experience, spouse in armed forces, presence of young children and race/ethnicity.

[10] Potential civilian experience represents the years spent in civilian life since discharge from the military.

Table 3.1 Summary Statistics

	Female		Male	
Variables	**Non-combat**	**Combat**	**Non-combat**	**Combat**
Labor Force Participation	0.723	0.754	0.895	0.848
Employment	0.635	0.625	0.790	0.770
Unemployment	0.121	0.171	0.117	0.091
Weekly Hours Worked	38.90	39.70	42.40	43.20
Age	28.872	29.650	28.763	30.300
Service-related Disability	0.249	0.408	0.164	0.344
Potential Experience	4.509	3.675	4.260	3.732
Spouse in Armed Forces	0.152	0.200	0.012	0.014
Young Child at Home	0.391	0.371	0.276	0.284
Number of Own Children	1.033	0.946	0.746	0.819
Married	0.521	0.475	0.478	0.521
Divorced/Widowed	0.199	0.221	0.111	0.148
Never Married	0.280	0.304	0.411	0.331
High School/GED	0.218	0.142	0.342	0.276
Some College	0.536	0.554	0.477	0.523
BA+	0.246	0.304	0.180	0.202
White, non-hispanic	0.690	0.713	0.751	0.743
Black, non-hispanic	0.147	0.129	0.085	0.083
Other, non-hispanic	0.050	0.067	0.075	0.060
Hispanic	0.114	0.092	0.088	0.113
Urban Residence	0.623	0.546	0.640	0.592
School Attendance	0.111	0.117	0.094	0.090
Military Service <2 Years	0.256	0.142	0.272	0.098
Military Service 2-4 Years	0.495	0.508	0.514	0.531
Military Service 5-9 Years	0.199	0.221	0.154	0.247
Military Service 10+ Years	0.043	0.125	0.047	0.115
N	422	240	1219	1588

Note: Combat is short of Combat Zone Experience. Unemployment and Usual weekly hours worked are computed conditional on labor force participation and employment.

Table 3.2 Mean Outcomes by Age, Gender, Combat Zone Experience, Service-related Disability, Race

Sub-samples	Labor Force Participation		Employment		Unemployment	
	Male	Female	Male	Female	Male	Female
Ages 18-24	0.815	0.643***	0.663	0.513***	0.187	0.203
Ages 25-30	0.864	0.703***	0.776	0.597***	0.102	0.150**
Ages 31-40	0.893	0.821***	0.827	0.735***	0.073	0.104
Spouse in Armed Forces	0.816	0.482***	0.579	0.393**	0.290	0.185
No Spouse in Armed Forces	0.869	0.785***	0.782	0.680***	0.101	0.134**
Young Child at Home	0.904	0.614***	0.820	0.520***	0.093	0.154**
No Young Child at Home	0.854	0.809**	0.763	0.701***	0.107	0.133
Combat Zone Experience	0.848	0.754***	0.770	0.625***	0.091	0.171***
No Combat Zone Experience	0.895	0.723***	0.790	0.635***	0.117	0.121
With Service-related Disability	0.787	0.680***	0.703	0.591***	0.107	0.130
No Service-related Disability	0.898	0.758***	0.806	0.649***	0.102	0.144**
White, non-hispanic	0.869	0.738***	0.793	0.639***	0.087	0.135***
Black, non-hispanic	0.869	0.763**	0.691	0.634	0.205	0.169
Hispanic	0.864	0.671***	0.749	0.557***	0.133	0.170

Note: Stars indicate significance level, * p<0.1, ** p<0.05, *** p<0.01.

3.4 Estimation and Results

3.4.1 Empirical Model

The main goal of this paper is to explore the determinants of the differences in the labor market performance of female and male veterans. I begin my analysis by examining whether female and male differences in the outcomes provided in Table 3.2 holds true when other demographic characteristics are controlled in a multivariate regression setting.

Three outcomes, labor force participation, employment to population and unemployment are binary variables. For this reason, I estimate nonlinear probability models, particularly probit models. The model is as follows,

$$P(Y_i = 1) = \Phi(\alpha + X_i\beta + M_i + \varepsilon_i) \quad (1)$$

where Y_i is an indicator equal to one if the individual *i* participates in the labor force, or employed or unemployed; X_i is a set of indicator variables of gender, race, marital status, education, whether the person married to a spouse in armed forces, presence of any young child, total number of own children, urban residence and continuous variables age and potential years of experience, computed as time since discharge from the military, and their quadratic forms to capture the effects of diminishing returns; M_i is a set of military characteristics such as indicator variables of combat zone experience status, service-related disability status, length of service category. In addition to these variables, each model contains year dummies in order to increase accuracy of the variables and to control for overall unobserved fixed effects.

For each outcome variable, I estimate four models. Model 1 is the baseline model. On order to test whether the labor outcomes differ among veterans I include interactions in other models. Model 2 include interactions of female and spouse in armed forces and presence of young child in the household. Model 3 examines the whether the effect of combat zone experience differs by gender interacting female and combat zone experience and service-related disability. finally, model 4 examines whether race/ethnicity composition matter on the labor outcomes.

As for the usual weekly hours of work, I estimate the same form of the model (1), instead, dependent variable is not binary, but continuous. In this respect, I estimate the above-

mentioned model with ordinary least squares (OLS). Since the probit is a nonlinear model, the probit coefficients do not reflect the marginal effects as is the case in OLS estimation. Average marginal effects are calculated using margins command in STATA version 13 and presented in Table 3.3, Table 3.4 and Table 3.5. For dummy variables, indicated as factor variables, margins command calculates the average change in the predicted probability for each case of discrete variable.

3.4.2 Estimation Results

3.4.2.1 Labor Force Participation

Table 3.3 presents the average marginal effects calculated after probit estimation of labor force participation. In all four models, females consistently less likely to participate in the labor force by 9 percentage points to 14 percentage points except for the model 2. Although combat experience appears to have little or no effect, veterans with service-related disability have lower probability of labor force participation across models. Model 1 is the baseline model; other models include interaction terms. All models except model 2 suggest that female veterans are less likely to be in the labor force. In model 2, I add interactions of female and a spouse in armed forces and presence of a young child at home. Results suggest that female veterans married to a spouse in armed forces and female veterans with young child at home are less likely to participate in the labor force by 21 percentage point than similar male veterans. It is likely that female veterans married to a spouse in armed forces have job search conflicts with their spouses and leave the labor force for caring their young children. When interactions are included, the female coefficient is not significant anymore. This result suggests that female veterans are only less likely to participate in the labor force when they have young children at home. Presence of young children matters for female veterans, as in the overall labor market.

Table 3.3 Average Marginal Effects From Probit Estimates of Labor Force Participation

Variables	AME (1)	AME (2)	AME (3)	AME (4)
Female	-0.095***	-0.022	-0.149***	-0.091***
	(0.018)	(0.020)	(0.027)	(0.020)
Combat Zone Experience	-0.006	-0.005	-0.024*	-0.006
	(0.012)	(0.012)	(0.014)	(0.012)
Service-related Disability	-0.100***	-0.102***	-0.107***	-0.100***
	(0.015)	(0.015)	(0.017)	(0.015)
Age	0.001	-0.000	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Spouse in Armed Forces	-0.207***	-0.048	-0.211***	-0.205***
	(0.041)	(0.057)	(0.041)	(0.041)
Young Child at Home	-0.006	0.043**	-0.008	-0.005
	(0.017)	(0.019)	(0.017)	(0.017)
Number of Own Children	-0.010	-0.011	-0.009	-0.010
	(0.008)	(0.008)	(0.008)	(0.008)
Married	0.041**	0.034**	0.043***	0.041**
	(0.016)	(0.016)	(0.016)	(0.016)
Divorced/Widowed	0.006	0.005	0.007	0.006
	(0.018)	(0.018)	(0.018)	(0.018)
Some College	-0.012	-0.011	-0.012	-0.012
	(0.014)	(0.013)	(0.014)	(0.014)
Ba+	0.064***	0.063***	0.061***	0.064***
	(0.017)	(0.016)	(0.017)	(0.017)
Black, non-hispanic	0.013	0.005	0.014	0.013
	(0.019)	(0.020)	(0.019)	(0.023)
Other, non-hispanic	-0.001	-0.005	-0.003	-0.001
	(0.023)	(0.023)	(0.023)	(0.023)
Hispanic	0.005	0.010	0.006	0.012
	(0.019)	(0.019)	(0.019)	(0.021)
Urban Residence	-0.013	-0.013	-0.011	-0.013
	(0.012)	(0.012)	(0.012)	(0.012)
School Attendance	-0.157***	-0.154***	-0.158***	-0.157***
	(0.018)	(0.018)	(0.018)	(0.018)
Potential Experience	0.012***	0.013***	0.012***	0.012***
	(0.003)	(0.003)	(0.003)	(0.003)

(continued)

Table 3.3 (continued)

Variables	AME (1)	AME (2)	AME (3)	AME (4)
Military Service 2-4 Years	-0.034**	-0.033**	-0.033*	-0.034**
	(0.017)	(0.017)	(0.017)	(0.017)
Military Service 5-9 Years	-0.012	-0.009	-0.011	-0.012
	(0.022)	(0.021)	(0.022)	(0.022)
Military Service 10+ Years	0.019	0.023	0.018	0.019
	(0.028)	(0.027)	(0.028)	(0.028)
Female X Spouse in Armed Forces		-0.180**		
		(0.084)		
Female X Young Child at Home		-0.217***		
		(0.037)		
Female X Combat Zone Experience			-0.082***	
			(0.024)	
Female X Service-related Disability			-0.122***	
			(0.029)	
Female X Black, non-hispanic				-0.093**
				(0.040)
Female X Hispanic				0.124***
				(0.047)
N	3469	3469	3469	3469

Note: Robust standard errors are reported in parentheses. Calculations use IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.1, ** p<0.05, *** p<0.01.

Model 3 suggests that female veterans with combat zone experience or service-related disability are less likely to participate in the labor force by more than 8 percentage points as compared to male veterans with combat experience or service-related disability. Combat zone experience and service-related disability disability appear to have significant negative effect on female veterans but not on male veterans. In Model 4, interactions of female veterans and race/ethnicity show that female veterans of color are 10 percentage points less likely to participate in the labor force.

3.4.2.2 Employment to Population

Table 3.4 presents the average marginal effects for probability of being employed. Baseline model 1 suggest that on average female veterans are less like to be employed when controlled for demographic differences. And across all models except model 2, female veterans are less likely to be employed than male veterans by about 10 percentage points. Model 2 shows that female veterans with young child at home are less likely to be employed than male counterparts by over 20 percentage points. However, being married to a spouse in armed forces is found to have no differential effect. Model 3 suggests that serving in a combat zone or having a service-related disability decreases the odds of employment of female veterans by about 9 percentage points as compared to similar male veterans. According to the results, combat zone experience and service-related disability harms employment of female veterans as compared to male veterans with combat zone experience or service-related disability. Among race/ethnicity interactions female veterans with Hispanic origin are less likely to be employed as compared to male veterans with Hispanic origin.

3.4.2.3 Unemployment

Table 3.5 reports the average marginal effects for the unemployment outcome. Except model 4 all models show that female veterans are equally employable as male veterans. In model 4, female veterans are found to be more likely to be unemployed once they participate in the labor force. Interactions of several characteristics suggest that female veterans are not different than male veterans about unemployment. Only female veterans with combat zone experience are more likely to be unemployed than male veterans with combat zone experience. As in previous estimates, combat zone experience has gender differential effects on the labor market outcomes.

Table 3.4 Average Marginal Effects From Probit Estimates of Employment to Population

Variables	AME (1)	AME (2)	AME (3)	AME (4)
Female	-0.097***	-0.033	-0.119***	-0.106***
	(0.021)	(0.024)	(0.028)	(0.023)
Combat Zone Experience	0.009	0.009	0.005	0.009
	(0.015)	(0.015)	(0.017)	(0.015)
Service-related Disability	-0.100***	-0.101***	-0.109***	-0.100***
	(0.017)	(0.017)	(0.019)	(0.017)
Age	0.004**	0.004	0.004**	0.004*
	(0.002)	(0.002)	(0.002)	(0.002)
Spouse in Armed Forces	-0.244***	-0.187**	-0.243***	-0.244***
	(0.043)	(0.077)	(0.043)	(0.043)
Young Child at Home	-0.006	0.038*	-0.007	-0.004
	(0.020)	(0.022)	(0.020)	(0.020)
Number of Own Children	-0.018**	-0.019**	-0.017*	-0.018**
	(0.009)	(0.009)	(0.009)	(0.009)
Married	0.040**	0.035*	0.041**	0.040**
	(0.019)	(0.019)	(0.019)	(0.019)
Divorced/Widowed	-0.034	-0.033	-0.034	-0.035
	(0.023)	(0.023)	(0.023)	(0.023)
Some College	0.016	0.016	0.016	0.016
	(0.016)	(0.016)	(0.016)	(0.016)
Ba+	0.087***	0.085***	0.085***	0.087***
	(0.020)	(0.020)	(0.020)	(0.020)
Black, non-hispanic	-0.065**	-0.072***	-0.065**	-0.085***
	(0.026)	(0.026)	(0.026)	(0.030)
Other, non-hispanic	-0.002	-0.005	-0.003	-0.003
	(0.028)	(0.028)	(0.028)	(0.028)
Hispanic	-0.027	-0.023	-0.027	-0.028
	(0.024)	(0.024)	(0.024)	(0.027)
Urban Residence	-0.025*	-0.026*	-0.024	-0.025*
	(0.015)	(0.015)	(0.015)	(0.015)
School Attendance	-0.171***	-0.170***	-0.172***	-0.172***
	(0.022)	(0.022)	(0.022)	(0.022)
Potential Experience	0.028***	0.029***	0.028***	0.028***
	(0.004)	(0.004)	(0.004)	(0.004)

(continued)

Table 3.4 (continued)

Variables	AME (1)	AME (2)	AME (3)	AME (4)
Military Service 2-4 Years	-0.011	-0.011	-0.011	-0.010
	(0.020)	(0.020)	(0.020)	(0.020)
Military Service 5-9 Years	0.007	0.009	0.007	0.007
	(0.024)	(0.024)	(0.024)	(0.024)
Military Service 10+ Years	0.026	0.028	0.026	0.026
	(0.033)	(0.032)	(0.033)	(0.033)
Female X Spouse in Armed Forces		-0.071		
		(0.078)		
Female X Young Child at Home		-0.214***		
		(0.037)		
Female X Combat Zone Experience			-0.099***	
			(0.032)	
Female X Service-related Disability			-0.085**	
			(0.036)	
Female X Black, non-hispanic				-0.047
				(0.041)
Female X Hispanic				-0.104**
				(0.051)
N	3469	3469	3469	3469

Note: Robust standard errors are reported in parentheses. Calculations use IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.1, ** p<0.05, *** p<0.01.

Combat zone experience appears to give harm to labor outcomes of female veterans as compared to male veterans.

3.4.2.4 Usual Weekly Hours Worked

The outcome of usual weekly hours of work is using the same form of the equation (1). Table 3.6 reports OLS estimates of usual weekly hours of work on four different model specifications. I find that among employed with positive hours of work, female veterans work less by about 3 hours across all models. Model 2 suggests that female veterans with young child at home work less than male veterans with young child at home by about 3 hours. As in

Table 3.5 Average Marginal Effects From Probit Estimates of Unemployment

Variables	AME (1)	AME (2)	AME (3)	AME (4)
Female	0.024	0.024	0.005	0.040**
	(0.017)	(0.020)	(0.021)	(0.020)
Combat Zone Experience	-0.017	-0.016	-0.028**	-0.017
	(0.012)	(0.012)	(0.013)	(0.012)
Service-related Disability	0.016	0.016	0.021	0.016
	(0.014)	(0.014)	(0.016)	(0.014)
Age	-0.004**	-0.004**	-0.004**	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
Spouse in Armed Forces	0.092**	0.164**	0.089**	0.092**
	(0.046)	(0.079)	(0.045)	(0.046)
Young Child at Home	-0.001	-0.005	-0.001	-0.001
	(0.016)	(0.017)	(0.016)	(0.016)
Number of Own Children	0.011	0.011	0.010	0.011
	(0.007)	(0.007)	(0.007)	(0.007)
Married	-0.010	-0.009	-0.008	-0.010
	(0.016)	(0.016)	(0.016)	(0.016)
Divorced/Widowed	0.044**	0.043**	0.045**	0.044**
	(0.020)	(0.020)	(0.020)	(0.020)
Some College	-0.031**	-0.031**	-0.031**	-0.032**
	(0.013)	(0.013)	(0.013)	(0.013)
Ba+	-0.037**	-0.037**	-0.038**	-0.037**
	(0.015)	(0.015)	(0.015)	(0.015)
Black, non-hispanic	0.089***	0.089***	0.089***	0.109***
	(0.024)	(0.024)	(0.024)	(0.029)
Other, non-hispanic	0.003	0.002	0.001	0.003
	(0.023)	(0.023)	(0.023)	(0.024)
Hispanic	0.035*	0.035*	0.035*	0.045*
	(0.021)	(0.021)	(0.021)	(0.024)
Urban Residence	0.017	0.017	0.017	0.017
	(0.012)	(0.012)	(0.012)	(0.012)
School Attendance	0.033	0.034*	0.034*	0.033*
	(0.020)	(0.020)	(0.020)	(0.020)
Potential Experience	-0.022***	-0.022***	-0.022***	-0.022***
	(0.003)	(0.003)	(0.003)	(0.003)

(continued)

Table 3.5 (continued)

Variables	AME (1)	AME (2)	AME (3)	AME (4)
Military Service 2-4 Years	-0.017	-0.017	-0.017	-0.017
	(0.015)	(0.015)	(0.015)	(0.015)
Military Service 5-9 Years	-0.016	-0.016	-0.014	-0.016
	(0.017)	(0.017)	(0.017)	(0.017)
Military Service 10+ Years	-0.007	-0.008	-0.007	-0.006
	(0.025)	(0.025)	(0.025)	(0.025)
Female X Spouse in Armed Forces		-0.037		
		(0.036)		
Female X Young Child at Home		0.042		
		(0.028)		
Female X Combat Zone Experience			0.075**	
			(0.034)	
Female X Service-related Disability			-0.018	
			(0.031)	
Female X Black, non-hispanic				-0.008
				(0.026)
Female X Hispanic				-0.001
				(0.033)
N	2,923	2,923	2,923	2,923

Note: Robust standard errors are reported in parentheses. Calculations use IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.1, ** p<0.05, *** p<0.01.

employment and labor force participation outcomes, having a young child at home only affects female veterans negatively. On the other hand, model 3 suggests that having combat zone experience or service-related disability does not affect the work load of veterans differently on the basis of gender. The race/ethnicity interactions show that female veterans of color work more than male veterans of color by about 2 hours.

Table 3.6 OLS Estimates of Usual Weekly Hours Worked

Variables	OLS (1)	OLS (2)	OLS (3)	OLS (4)
Female	-3.872***	-3.066***	-3.998***	-4.303***
	(0.334)	(0.379)	(0.387)	(0.383)
Combat Zone Experience	0.673**	0.630**	0.648**	0.682**
	(0.287)	(0.287)	(0.301)	(0.287)
Service-related Disability	-0.926***	-0.932***	-1.002**	-0.914**
	(0.358)	(0.357)	(0.398)	(0.358)
Age	0.650**	0.626**	0.645**	0.659**
	(0.306)	(0.306)	(0.306)	(0.306)
Age Squared	-0.009*	-0.008*	-0.009*	-0.009*
	(0.005)	(0.005)	(0.005)	(0.005)
Spouse in Armed Forces	-2.020**	0.246	-2.031**	-2.048**
	(0.996)	(2.034)	(0.998)	(0.998)
Young Child at Home	-0.222	0.209	-0.223	-0.232
	(0.305)	(0.324)	(0.305)	(0.305)
Number of Own Children	0.218*	0.207*	0.221*	0.217*
	(0.126)	(0.126)	(0.126)	(0.126)
Married	1.031***	1.008***	1.032***	1.039***
	(0.333)	(0.333)	(0.334)	(0.333)
Divorced/Widowed	0.684*	0.706*	0.688*	0.666*
	(0.399)	(0.399)	(0.399)	(0.399)
Some College	-0.527*	-0.524*	-0.524*	-0.525*
	(0.280)	(0.280)	(0.280)	(0.280)
Ba+	0.703**	0.701**	0.700**	0.697**
	(0.325)	(0.325)	(0.325)	(0.325)
Black, non-hispanic	-1.113***	-1.159***	-1.108***	-1.510***
	(0.345)	(0.345)	(0.345)	(0.390)
Other, non-hispanic	-0.530	-0.548	-0.528	-0.523
	(0.523)	(0.521)	(0.523)	(0.523)
Hispanic	-0.952**	-0.918**	-0.950**	-1.272***
	(0.430)	(0.430)	(0.430)	(0.468)
Urban Residence	-0.950***	-0.952***	-0.946***	-0.944***
	(0.263)	(0.263)	(0.263)	(0.263)
School Attendance	-4.936***	-4.918***	-4.948***	-4.957***
	(0.727)	(0.723)	(0.726)	(0.728)
Potential Experience	0.039	0.040	0.040	0.040
	(0.070)	(0.070)	(0.070)	(0.070)
Potential Experience SQ.	-0.001	-0.001	-0.001	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)

(continued)

Table 3.6 (continued)

Variables	OLS (1)	OLS (2)	OLS (3)	OLS (4)
Military Service 2-4 Years	-0.177	-0.145	-0.177	-0.179
	(0.377)	(0.377)	(0.377)	(0.377)
Military Service 5-9 Years	0.169	0.199	0.167	0.166
	(0.467)	(0.466)	(0.468)	(0.467)
Military Service 10+ Years	0.166	0.195	0.155	0.159
	(0.658)	(0.659)	(0.658)	(0.658)
Female X Spouse in Armed Forces		-2.828		
		(2.298)		
Female X Young Child at Home		-2.934***		
		(0.716)		
Female X Combat Zone Experience			0.271	
			(0.770)	
Female X Service-related Disability			0.436	
			(0.853)	
Female X Black, non-hispanic				1.857**
				(0.795)
Female X Hispanic				2.401**
				(1.132)
Constant	32.605***	32.908***	32.694***	32.543***
	(4.754)	(4.750)	(4.752)	(4.750)
N	2,604	2,604	2,604	2,604
R-Squared	0.051	0.053	0.051	0.051

Note: This table reports average marginal effects calculated after probit regressions of employment. Robust standard errors are reported in parentheses. Calculations use IPUMS-CPS sampling weights. Stars indicate significance level, * p<0.1, ** p<0.05, *** p<0.01.

3.5 Concluding Remarks

This paper contributes to literature by examining, for the first time, the gender differences in the effects of recent military experience, including overseas deployments and combat zone experience, on the labor market performance of female veterans. The measures of success in the labor market include: labor force participation, employment, unemployment, and usual weekly hours of work. I find that female veterans are less likely to participate in the labor force and less likely to be employed than comparable male veterans and also, that once they are in the labor force, they are equally employable as male veterans, which is consistent with the findings of past studies (M. Kleykamp, 2013; Routon, 2014). Further I show evidence that female veterans work less than male veterans once they are employed. The findings of this study suggest that female veterans have difficulty entering the labor force and finding jobs once they return to civilian life as compared to male veterans. As the representation of women in the U.S. military increase, there will be more female veterans in the future. Policymakers should note that female veterans are more likely to have lower labor market success than male veterans.

The findings from this study make several contributions to the current literature. First, this study shows that combat zone experience harms labor market performance of female veterans as compared to male veterans. Reasons for differences in the effects of combat zone experience on the labor outcomes of veterans on the basis of gender may be related to effects of combat on health outcomes. Past studies show evidence that combat experience is associated with worse health problems, particularly mental health problems including PTSD (Cesur et al., 2013; Hoge et al., 2004). And studies show that females respond to stress in a different way than males, particularly, female veterans are more likely to have trauma than male veterans (Nayback, 2008; Zinzow et al., 2007). Overall, the adverse differential effect of combat zone experience has

important policy implications. The U.S. Government recently announced that all occupations in the military, including direct combat units, are open to women. Thus, there will be more female veterans in the civilian life with combat zone experience. Policymakers should note the potential differential effects of the combat experience on the subsequent labor outcomes of female veterans compared to male veterans.

Secondly, this study shows that female veterans are more likely to have a young child at home, and these female veterans with a young child at home are less likely to participate in the labor force and less likely to be employed as compared to male veterans. Due to the nature of military service and overseas deployments, female veterans may not consider to have child while in the military. Thus these type of commitments emerge in subsequent civilian life. Recently, Department of Defense has taken steps in order to make the military a more family friendly environment for active duty personnel extending the maternity and paternity leave for military families and expanding hours of child care centers (Ryan, 2016). However, the findings of this study suggest that a similar policy development is needed for labor market success of female veterans.

The overall findings of the current study may serve as a base for future policy recommendations such that needs of female veterans are different than male veterans in order to succeed in the labor market after discharge from the military. Regarding the increasing contribution to the military and all combat positions, policy makers should consider potential differences in the effects of military service on the subsequent labor outcomes of female veterans.

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